Enterasys® SecureStack™ B2

Stackable Switches

Configuration Guide

Firmware Version 4.02.xx.xxxx

P/N 9034133-15

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About This Guide

Welcome to the *Enterasys® SecureStack™ B2 Configuration Guide*. This manual explains how to access the device's Command Line Interface (CLI) and how to use it to configure SecureStack B2 switch devices.

Important Notice

Depending on the firmware version used in your SecureStack device, some features described in this document may not be supported. Refer to the Release Notes shipped with your device to determine which features are supported.

Using This Guide

A general working knowledge of basic network operations and an understanding of CLI management applications is helpful before configuring the SecureStack device.

This manual describes how to do the following:

- Access the SecureStack CLI.
- Use CLI commands to perform network management and device configuration operations
- Establish and manage Virtual Local Area Networks (VLANs).
- Establish and manage static and dynamically-assigned policy classifications.
- Establish and manage priority classification.
- Configure security protocols, including 802.1X and RADIUS, SSHv2, MAC locking, and MAC authentication.

Structure of This Guide

The guide is organized as follows:

Chapter 1, **Introduction**, provides an overview of the tasks that can be accomplished using the CLI interface, an overview of local management requirements, an overview of the device's factory default settings, and information about using the Command Line Interface (CLI).

Chapter 2, **Configuring Switches in a Stack**, provides information about how to configure and manage stacked switches.

Chapter 3, **Basic Configuration**, provides how to set basic system properties, how to download a firmware image, how to configure WebView and Telnet, how to manage configuration files, how to set the login password, and how to exit the CLI.

Chapter 4, **Activating Licensed Features**, describes the commands used to activate licensed features.

Chapter 5, **Configuring System Power and PoE**, describes the commands used to review and set system power and PoE parameters on devices that offer Power over Ethernet.

Chapter 6, **Discovery Protocol Configuration** provides how to configure discovery protocols supported by the device.

Chapter 7, **Port Configuration**, describes how to review and configure console port settings, and how to enable or disable switch ports and configure switch port settings, including port speed, duplex mode, auto-negotiation, flow control, port mirroring, link aggegation and broadcast suppression.

Chapter 8, **SNMP Configuration**, describes how to configure SNMP users and user groups, access rights, target addresses, and notification parameters.

Chapter 9, **Spanning Tree Configuration**, describes how to review and set Spanning Tree bridge parameters for the device, including bridge priority, hello time, maximum aging time and forward delay; and how to review and set Spanning Tree port parameters, including port priority and path costs. Configuring the SpanGuard and Loop Protect functions is also described.

Chapter 10, **802.1Q VLAN Configuration**, describes how to create static VLANs, select the mode of operation for each port, establish VLAN forwarding (egress) lists, route frames according to VLAN ID, display the current ports and port types associated with a VLAN and protocol, create a secure management VLAN, and configure ports on the device as GVRP-aware ports.

Chapter 11, **Differentiated Services Configuration**, describes how to display and configure Diffserv parameters.

Chapter 12, **Policy Classification Configuration**, describes how to create, change or remove user roles or profiles based on business-specific use of network services; how to permit or deny access to specific services by creating and assigning classification rules which map user profiles to frame filtering policies; how to classify frames to a VLAN or Class of Service (CoS); and how to assign or unassign ports to policy profiles so that only ports activated for a profile will be allowed to transmit frames accordingly.

Chapter 13, **Port Priority and Rate Limiting Configuration**, describes how to set the transmit priority of each port and configure a rate limit for a given port and list of priorities.

Chapter 14, **IGMP Configuration**, describes how to configure Internet Group Management Protocol (IGMP) settings for multicast filtering.

Chapter 15, **Logging and Network Management**, describes how to configure Syslog, how to manage general switch settings, how to monitor network events and status,and how to configure SNTP and node aliases.

Chapter 16, **RMON Configuration**, describes how to use RMON (Remote Network Monitoring), which provides comprehensive network fault diagnosis, planning, and performance tuning information and allows for interoperability between SNMP management stations and monitoring agents.

Chapter 17, **DHCP Server Configuration**, describes how to review and configure DHCP server parameters, how to review and configure DHCP address pools, and how to display DHCP server information.

Chapter 18, **DHCP Snooping and Dynamic ARP Inspection**, describes two security features — DHCP snooping, which monitors DHCP messages between a DHCP client and DHCP server to filter harmful DHCP messages and to build a database of authorized address bindings , and Dynamic ARP inspection, which uses the bindings database created by the DHCP snooping feature to reject invalid and malicious ARP packets.

Chapter 19, **Authentication and Authorization Configuration**, describes how to configure 802.1X authentication using EAPOL, how to configure RADIUS server, Secure Shell server, MAC authentication, MAC locking, and Port Web Authentication.

Related Documents

The following Enterasys Networks documents may help you to set up, control, and manage the SecureStack device:

- *Enterasys Firmware Feature Guides*
- SecureStack B2 Installation Guide(s)
- *SecureStack Redundant Power System Installation Guide*

Documents listed above, can be obtained from the World Wide Web in Adobe Acrobat Portable Document Format (PDF) at the following web site:

http://www.enterasys.com/support/manuals/

Conventions Used in This Guide

The following conventions are used in the text of this document:

Convention	Description
Bold font	Indicates mandatory keywords, parameters or keyboard keys.
italic font	Indicates complete document titles.
`Courier` font	Used for examples of information displayed on the screen.
`Courier` font in italics	Indicates a user-supplied value, either required or optional.
[ ]	Square brackets indicate an optional value.
{ }	Braces indicate required values. One or more values may be required.
|	A vertical bar indicates a choice in values.
[x | y | z]	Square brackets with a vertical bar indicate a choice of a value.
{x | y | z}	Braces with a vertical bar indicate a choice of a required value.
[x {y | z}]	A combination of square brackets with braces and vertical bars indicates a required choice of an optional value.

The following icons are used in this guide:

Note: Calls the reader's attention to any item of information that may be of special importance.

Caution: Contains information essential to avoid damage to the equipment.

Getting Help

For additional support related to this switch or document, contact Enterasys Networks using one of the following methods:

World Wide Web	http://www.enterasys.com/support
Phone	1-800-872-8440 (toll-free in U.S. and Canada) or 1-978-684-1000 For the Enterasys Networks Support toll-free number in your country: http://www.enterasys.com/support

Internet mail	support@enterasys.com To expedite your message, type **[SWITCHING]** in the subject line.

To send comments or suggestions concerning this document to the Technical Publications Department:

techpubs@enterasys.com

Make sure to include the document Part Number in the email message.

Before calling Enterasys Networks, have the following information ready:

- Your Enterasys Networks service contract number
- A description of the failure
- A description of any action(s) already taken to resolve the problem (for example, changing mode switches or rebooting the unit)
- The serial and revision numbers of all involved Enterasys Networks products in the network
- A description of your network environment (for example, layout, cable type)
- Network load and frame size at the time of trouble (if known)
- The switch history (for example, have you returned the switch before, is this a recurring problem?)
- Any previous Return Material Authorization (RMA) numbers

1

Introduction

This chapter provides an overview of the SecureStack B2's unique features and functionality, an overview of the tasks that may be accomplished using the CLI interface, an overview of ways to manage the switch, factory default settings, and information about how to use the Command Line Interface to configure the switch.

For information about...	Refer to page...
SecureStack B2 CLI Overview	1-1
Switch Management Methods	1-1
Factory Default Settings	1-2
Using the Command Line Interface	1-5

SecureStack B2 CLI Overview

The Enterasys Networks SecureStack B2 CLI interface allows you to perform a variety of network management tasks, including the following:

- Use CLI commands to perform network management and switch configuration operations.
- Download a new firmware image.
- Assign IP address and subnet mask.
- Select a default gateway.
- Establish and manage Virtual Local Area Networks (VLANs).
- Establish and manage policy profiles and classifications.
- Establish and manage priority classification.
- Configure security protocols, including 802.1X and RADIUS, SSHv2, PWA, MAC locking, and MAC authentication.

Switch Management Methods

The SecureStack B2 switch can be managed using the following methods:

- Locally using a VT type terminal connected to the console port.
- Remotely using a VT type terminal connected through a modem.
- Remotely using an SNMP management station.
- In-band through a Telnet connection.
- In-band using the Enterasys NetSight® management application.

- Remotely using WebView™, Enterasys Networks' embedded web server application.

The *Installation Guide* for your SecureStack B2 device provides setup instructions for connecting a terminal or modem to the switch.

Factory Default Settings

The following tables list factory default settings available on the SecureStack B2 switch.

Table 1-1 Default Settings for Basic Switch Operation

Feature	Default Setting
Switch Mode Defaults	
CDP discovery protocol	Auto enabled on all ports.
CDP authentication code	Set to 00-00-00-00-00-00-00-00
CDP hold time	Set to 180 seconds.
CDP interval	Transmit frequency of CDP messages set to 60 seconds.
Cisco discovery protocol	Auto enabled on all ports.
Cisco DP hold time	Set to 180 seconds.
Cisco DP interval timer	Set to 60 seconds.
Community name	Public.
Console (serial) port required settings	Baud rate: 9600 Data bits: 8 Flow control: disabled Stop bits: 1 Parity: none
DHCP server	Disabled.
Diffserv	Disabled.
EAPOL	Disabled.
EAPOL authentication mode	When enabled, set to auto for all ports.
GARP timer	Join timer set to 20 centiseconds; leave timer set to 60 centiseconds; leaveall timer set to 1000 centiseconds.
GVRP	Globally enabled.
History buffer size	20 lines.
IEEE 802.1 authentication	Disabled.
IGMP snooping	Disabled. When enabled, query interval is set to 260 seconds and response time is set to 10 seconds.
IP mask and gateway	Subnet mask set to 0.0.0.0; default gateway set to 0.0.0.0.
IP routes	No static routes configured.
Jumbo frame support	Enabled on all ports.
Link aggregation control protocol (LACP)	Enabled.

Table 1-1 Default Settings for Basic Switch Operation (Continued)

Feature	Default Setting
Link aggregation admin key	Set to 32768 for all ports.
Link aggregation flow regeneration	Disabled.
Link aggregation system priority	Set to 32768 for all ports.
Link aggregation outport algorithm	Set to DIP-SIP.
Lockout	Set to disable Read-Write and Read-Only users, and to lockout the default admin (Super User) account for 15 minutes, after 3 failed login attempts.
Logging	Syslog port set to UDP port number 514. Logging severity level set to 6 (significant conditions) for all applications.
MAC aging time	Set to 300 seconds.
MAC locking	Disabled (globally and on all ports).
Passwords	Set to an empty string for all default user accounts. User must press ENTER at the password prompt to access CLI.
Password aging	Disabled.
Password history	No passwords are checked for duplication.
Policy classification	Classification rules are automatically enabled when created.
Port auto-negotiation	Enabled on all ports.
Port advertised ability	Maximum ability advertised on all ports.
Port broadcast suppression	Enabled and set to limit broadcast packets to 14,881 per second on all switch ports.
Port duplex mode	Set to half duplex, except for 100BASE-FX and 1000BASE-X, which is set to full duplex.
Port enable/disable	Enabled.
Port priority	Set to 0.
Port speed	Set to 10 Mbps, except for 1000BASE-X, which is set to 1000 Mbps, and 100BASE-FX, which is set to 100 Mbps.
Port trap	All ports are enabled to send link traps.
Power over Ethernet port admin state	Administrative state is on (auto).
Priority classification	Classification rules are automatically enabled when created.
RADIUS client	Disabled.
RADIUS last resort action	When the client is enabled, set to Challenge.
RADIUS retries	When the client is enabled, set to 3.
RADIUS timeout	When the client is enabled, set to 20 seconds.
Rate limiting	Disabled (globally and on all ports).
SNMP	Enabled.

Table 1-1 Default Settings for Basic Switch Operation (Continued)

Feature	Default Setting
SNTP	Disabled.
Spanning Tree	Globally enabled and enabled on all ports.
Spanning Tree edge port administrative status	Edge port administrative status begins with the value set to **false** initially after the device is powered up. If a Spanning Tree BDPU is not received on the port within a few seconds, the status setting changes to **true**.
Spanning Tree edge port delay	Enabled.
Spanning Tree forward delay	Set to 15 seconds.
Spanning Tree hello interval	Set to 2 seconds.
Spanning Tree ID (SID)	Set to 0.
Spanning Tree maximum aging time	Set to 20 seconds.
Spanning Tree port priority	All ports with bridge priority are set to 128 (medium priority).
Spanning Tree priority	Bridge priority is set to 32768.
Spanning Tree topology change trap suppression	Enabled.
Spanning Tree version	Set to mstp (Multiple Spanning Tree Protocol).
SSH	Disabled.
System baud rate	Set to 9600 baud.
System contact	Set to empty string.
System location	Set to empty string.
System name	Set to empty string.
Terminal	CLI display set to 80 columns and 24 rows.
Timeout	Set to 5 minutes.
User names	Login accounts set to **ro** for Read-Only access; **rw** for Read-Write access; and **admin** for Super User access.
VLAN dynamic egress	Disabled on all VLANs.
VLAN ID	All ports use a VLAN identifier of 1.
Host VLAN	Default host VLAN is 1.

Using the Command Line Interface

Starting a CLI Session

Connecting Using the Console Port

Connect a terminal to the local console port as described in your SecureStack B2 *Installation Guide*. The startup screen, Figure 1-1, will display on the terminal. You can now start the Command Line Interface (CLI) by

- using a default user account, as described in "Using a Default User Account" on page 1-6, or
- using an administratively-assigned user account as described in "Using an Administratively Configured User Account" on page 1-6.

Figure 1-1 SecureStack B2 Startup Screen

```
Username:admin
Password:

Enterasys SecureStack B2
Command Line Interface

Enterasys Networks, Inc.
50 Minuteman Rd.
Andover, MA 01810-1008 U.S.A.

Phone: +1 978 684 1000
E-mail: support@enterasys.com
WWW: http://www.enterasys.com

(c) Copyright Enterasys Networks, Inc. 2008

Chassis Serial Number:      041800249041
Chassis Firmware Revision:  4.02.xx


B2(su)->
```

Connecting Using Telnet

Once the SecureStack B2 device has a valid IP address, you can establish a Telnet session from any TCP/IP based node on the network. For information about setting the switch's IP address, refer to "set ip address" on page 3-11.

To establish a Telnet session:

1. Telnet to the switch's IP address.
2. Enter login (user name) and password information in one of the following ways:
   - If the switch's default login and password settings have not been changed, follow the steps listed in "Using a Default User Account" on page 1-6, or
   - Enter an administratively-configured user name and password.

The notice of authorization and the prompt displays as shown in Figure 1-1.

For information about configuring Telnet settings, refer to "Starting and Configuring Telnet" on page 3-35.

Refer to the instructions included with the Telnet application for information about establishing a Telnet session.

Logging In

By default, the SecureStack B2 switch is configured with three user login accounts—**ro** for Read-Only access, **rw** for Read-Write access, and **admin** for super-user access to all modifiable parameters. The default password is set to a blank string. For information on changing these default settings, refer to "Setting User Accounts and Passwords" on page 3-2.

Using a Default User Account

If this is the first time you are logging in to the SecureStack B2 switch, or if the default user accounts have not been administratively changed, proceed as follows:

1. At the login prompt, enter one of the following default user names:
   - **ro** for Read-Only access.
   - **rw** for Read-Write access.
   - **admin** for Super User access.
2. Press ENTER. The Password prompt displays.
3. Leave this string blank and press ENTER. The switch information and prompt displays as shown in Figure 1-1.

Using an Administratively Configured User Account

If the switch's default user account settings have been changed, proceed as follows:

1. At the login prompt, enter your administratively-assigned user name and press ENTER.
2. At the Password prompt, enter your password and press ENTER.

The notice of authorization and the prompt displays as shown in Figure 1-1.

Note: Users with Read-Write (rw) and Read-Only access can use the set password command (page 3-5) to change their own passwords. Administrators with Super User (su) access can use the set system login command (page 3-4) to create and change user accounts, and the set password command to change any local account password.

Navigating the Command Line Interface

Getting Help with CLI Syntax

The SecureStack B2 switch allows you to display usage and syntax information for individual commands by typing **help** or **?** after the command.

CLI Command Defaults Descriptions

Each command description in this guide includes a section entitled "Defaults" which contains different information from the factory default settings on the switch described in Table 1-1. The section defines CLI behavior if the user enters a command without typing optional parameters (indicated by square brackets [ ]). For commands without optional parameters, the defaults section lists "None". For commands with optional parameters, this section describes how the CLI responds if the user opts to enter only the keywords of the command syntax. Figure 1-2 provides an example.

Figure 1-2 Sample CLI Defaults Description

Syntax

show port status [*port-string*]

Defaults

If *port-string* is not specified, status information for all ports will be displayed.

CLI Command Modes

Each command description in this guide includes a section entitled "Mode" which states whether the command is executable in Admin (Super User), Read-Write, or Read-Only mode. Users with Read-Only access will only be permitted to view Read-Only (**show**) commands. Users with Read-Write access will be able to modify all modifiable parameters in **set** and **show** commands, as well as view Read-Only commands. Administrators or Super Users will be allowed all Read-Write and Read-Only privileges, and will be able to modify local user accounts. The SecureStack B2 switch indicates which mode a user is logged in as by displaying one of the following prompts:

- Admin: B2(su)->
- Read-Write: B2(rw)->
- Read-Only: B2(ro)->

Performing Keyword Lookups

Entering a space and a question mark (**?**) after a keyword will display all commands beginning with the keyword. Figure 1-3 shows how to perform a keyword lookup for the **show snmp** command. In this case, four additional keywords are used by the **show snmp** command. Entering a space and a question mark (**?**) after any of these parameters (such as **show snmp community**) will display additional parameters nested within the syntax.

Figure 1-3 Performing a Keyword Lookup

```
B2(su)->show snmp ?

community               SNMP v1/v2c community name configuration
notify                  SNMP notify configuration
targetaddr              SNMP target address configuration
targetparams            SNMP target parameters configuration
```

Entering a question mark (**?**) without a space after a partial keyword will display a list of commands that begin with the partial keyword. Figure 1-4 shows how to use this function for all commands beginning with **co:**

Figure 1-4 Performing a Partial Keyword Lookup

```
B2(rw)->co?
configure               copy
B2(su)->co
```

Note: At the end of the lookup display, the system will repeat the command you entered without the ?.

Displaying Scrolling Screens

If the CLI screen length has been set using the **set length** command as described on page 3-28, CLI output requiring more than one screen will display `--More--` to indicate continuing screens. To display additional screen output:

- Press any key other than ENTER to advance the output one screen at a time.
- Press ENTER to advance the output one line at a time.

The example in Figure 1-5 shows how the **show mac** command indicates that output continues on more than one screen.

Figure 1-5 Scrolling Screen Output

```
B2(su)->show mac

MAC Address           FID       Port      Type
 ------------------------------------------------------------
 00-00-1d-67-68-69      1       host      Management
 00-00-02-00-00-00      1       ge.1.2    Learned
 00-00-02-00-00-01      1       ge.1.3    Learned
 00-00-02-00-00-02      1       ge.1.4    Learned
 00-00-02-00-00-03      1       ge.1.5    Learned
 00-00-02-00-00-04      1       ge.1.6    Learned
 00-00-02-00-00-05      1       ge.1.7    Learned
 00-00-02-00-00-06      1       ge.1.8    Learned
 00-00-02-00-00-07      1       ge.1.9    Learned
 00-00-02-00-00-08      1       ge.1.10   Learned
--More--
```

Abbreviating and Completing Commands

The SecureStack B2 switch allows you to abbreviate CLI commands and keywords down to the number of characters that will allow for a unique abbreviation. Figure 1-6 shows how to abbreviate the **show netstat** command to **sh net**.

Figure 1-6 Abbreviating a Command

```
B2(su)->sh net
Active Internet connections (including servers)
Proto Recv-Q Send-Q  Local Address          Foreign Address        State
----- ------ ------  --------------------- ---------------------- -------
TCP        0      0  10.21.73.13.23        134.141.190.94.51246   ESTABLISHED
TCP        0    275  10.21.73.13.23        134.141.192.119.4724   ESTABLISHED
TCP        0      0  *.80                  *.*                    LISTEN
TCP        0      0  *.23                  *.*                    LISTEN
UDP        0      0  10.21.73.13.1030      134.141.89.113.514
UDP        0      0  *.161                 *.*
UDP        0      0  *.1025                *.*
UDP        0      0  *.123                 *.*
```

Basic Line Editing Commands

The CLI supports EMACs-like line editing commands. Table 1-2 lists some commonly used commands.

Table 1-2 Basic Line Editing Commands

Key Sequence	Command
Ctrl+A	Move cursor to beginning of line.
Ctrl+B	Move cursor back one character.
Ctrl+D	Delete a character.
Ctrl+E	Move cursor to end of line.
Ctrl+F	Move cursor forward one character.
Ctrl+H	Delete character to left of cursor.
Ctrl+I or TAB	Complete word.
Ctrl+K	Delete all characters after cursor.
Ctrl+N	Scroll to next command in command history (use the CLI history command to display the history).
Ctrl+P	Scroll to previous command in command history.
Ctr1+Q	Resume the CLI process.
Ctr1+S	Pause the CLI process (for scrolling).
Ctrl+T	Transpose characters.
Ctrl+U or Ctrl+X	Delete all characters before cursor.
Ctrl+W	Delete word to the left of cursor.
Ctrl+Y	Restore the most recently deleted item.

2

Configuring Switches in a Stack

This chapter provides information about configuring SecureStack B2 switches in a stack.

For information about ...	Refer to page ...
About SecureStack B2 Switch Operation in a Stack	2-1
Installing a New Stackable System of Up to Eight Units	2-2
Installing Previously-Configured Systems in a Stack	2-3
Adding a New Unit to an Existing Stack	2-3
Creating a Virtual Switch Configuration	2-3
Considerations About Using Clear Config in a Stack	2-4
Issues Related to Mixed Type Stacks	2-5
Stacking Configuration and Management Commands	2-5

About SecureStack B2 Switch Operation in a Stack

The SecureStack B2 products are stackable switches that can be adapted and scaled to help meet your network needs. These switches provide a management platform and uplink to a network backbone for a stacked group of up to eight SecureStack B2 switches.

Note: You can mix SecureStack B2 and B3 switches in a single stack, although only the lowest common denominator of functionality will be supported in a mixed stack. Refer to "Issues Related to Mixed Type Stacks" on page 2-5 for information about configuring a mixed stack.

Once installed in a stack, the switches behave and perform as a single switch product. As such, you can start with a single unit and add more units as your network expands. You can also mix different products in the family in a single stack to provide a desired combination of port types and functions to match the requirements of individual applications. In all cases, a stack of units performs as one large product, and is managed as a single network entity.

When switches are installed and connected as described in the SecureStack B2 Installation Guides, the following occurs during initialization:

- The switch that will manage the stack is automatically established. This is known as the manager switch.
- All other switches are established as members in the stack.
- The hierarchy of the switches that will assume the function of backup manager is also determined in case the current manager malfunctions, is powered down, or is disconnected from the stack.

- The console port on the manager switch remains active for out-of-band (local) switch management, but the console port on each member switch is deactivated. This enables you to set the IP address and system password using a single console port. Now each switch can be configured locally using only the manager's console port, or inband using a remote device and the CLI set of commands described in this section.

Once a stack is created (more than one switch is interconnected), the following procedure occurs:

1. By default, unit IDs are arbitrarily assigned on a first-come, first-served basis.
2. Unit IDs are saved against each module. Then, every time a board is power-cycled, it will initialize with the same unit ID. This is important for port-specific information (for example: ge.4.12 is the 12th Gigabit Ethernet port on Unit # 4).
3. The management election process uses the following precedence to assign a management switch:
   a. Previously assigned / elected management unit
   b. Management assigned priority (values 1-15)
   c. Hardware preference level
   d. Highest MAC Address

Use the following recommended procedures when installing a new stackable system or adding a new unit to an existing stack.

Important

The following procedures assume that all units have a clean configuration from manufacturing. When adding a new unit to an already running stack, it is also assumed that the new unit is using the same firmware image version as other units in the stack.

Installing a New Stackable System of Up to Eight Units

Use the following procedure for installing a new stack of up to eight units out of the box.

1. Before applying power, make **all** physical connections with the stack cables as described in the SecureStack B2 Installation Guides.
2. Once all of the stack cables have been connected, individually power on each unit from top to bottom.

Notes: Ensure that each switch is fully operational before applying power to the next switch. Since unit IDs are assigned on a first-come, first-served basis, this will ensure that unit IDs are ordered sequentially.

Once unit IDs are assigned, they are persistent and will be retained during a power cycle to any or all of the units.

3. (Optional) If desired, change the management unit using the **set switch movemanagement** command as described in "set switch movemanagement" on page 2-10.
4. Once the desired master unit has been selected, reset the system using the **reset** command (page 3-48).
5. After the stack has been configured, you can use the **show switch** *unit* command (page 2-6) to physically identify each unit. When you enter the command with a unit number, the MGR LED of the specified switch will blink for 10 seconds. The normal state of this LED is off for member units and steady green for the manager unit.

Installing Previously-Configured Systems in a Stack

If member units in a stack have been previous members of a different stack, you may need to configure the renumbering of the stack as follows:

1. Stack the units in the method desired, and connect the stack cables.
2. Power up only the unit you wish to be manager.
3. Once the management unit is powered up, log into the CLI, and use the **show switch** command as described in "show switch" on page 2-6 to display stacking information.
4. Clear any switches which are listed as "unassigned" using the **clear switch member** command as described in "clear switch member" on page 2-11.
5. Power up the member of the stack you wish to become unit 2. Once the second unit is fully powered, the COM session of the CLI will state that a new CPU was added.
6. Use the **show switch** command to redisplay stacking information.
   a. If the new member displays as unit 2, you can proceed to repeat this step with the next unit.
   b. If the new member displays a different unit number, you must:
      (1) Renumber the stack using the **set switch renumber** command as described in "set switch" on page 2-9, then
      (2) Clear the original unit number using the **clear switch member** command.
7. Repeat Step 6 until all members have been renumbered in the order you desire.
8. After the stack has been reconfigured, you can use the **show switch** *unit* command ("show switch" on page 2-6) to physically confirm the identity of each unit. When you enter the command with a unit number, the MGR LED of the specified switch will blink for 10 seconds. The normal state of this LED is off for member units and steady green for the manager unit.

Adding a New Unit to an Existing Stack

Use the following procedure for installing a new unit to an existing stack configuration. This procedure assumes that the new unit being added has a clean configuration from manufacturing and is running the same firmware image version as other units in the stack.

1. Ensure that power is off on the new unit being installed.
2. Use one of the following methods to complete stack cable connections:
   – If the running stack uses a daisy chain topology, make the stack cable connections from the bottom of the stack to the new unit (that is, STACK DOWN port from the bottom unit of the running stack to the STACK UP port on the new unit).
   – If the running stack uses a ring stack topology, break the ring and make the stack cable connections to the new unit to close the ring.
3. Apply power to the new unit.

Creating a Virtual Switch Configuration

You can create a configuration for a SecureStack B2 switch before adding the actual physical device to a stack. This preconfiguration feature includes configuring protocols on the ports of the "virtual switch."

To create a virtual switch configuration in a stack environment:

1. Display the types of switches supported in the stack, using the **show switch switchtype** command (page 2-7).
2. Using the output of the **show switch switchtype** command, determine the switch index (SID) of the model of switch being configured.
3. Add the virtual switch to the stack using the **set switch member** command (page 2-11). Use the SID of the switch model, determined in the previous step, and the unit ID that you want to assign to this switch member.
4. Proceed to configure the ports of the virtual switch as you would do for physically present devices.

The following example adds a B2G124-24 model to a stack as unit 2 of the stack. The first port on that virtual switch is then associated with VLAN 555.

```
B2(su)->show switch switchtype
                                      Mgmt   Code
SID         Switch Model ID           Pref  Version
--- ------------------------------- ---- ---------
1   B2G124-24                       1    0xa08245
2   B2G124-48                       1    0xa08245
3   B2G124-48P                      1    0xa08245
4   B2H124-48                       1    0xa08245
5   B2H124-48P                      1    0xa08245
6   B3G124-24P                      1    0xa08245
7   B3G124-48P                      1    0xa08245
8   B3G124-48                       1    0xa08245
9   B3G124-24                       1    0xa08245

B2(su)->set switch member 2 1

B2(su)->show switch
        Management    Preconfig     Plugged-in         Switch          Code
Switch    Status      Model ID      Model ID           Status         Version
------ ------------ ------------- ------------ --------------------- --------
1      Mgmt Switch   B2G124-48    B2G124-48      OK                    4.02.xx
2      Unassigned    B2G124-24                   Not Present           00.00.00

B2(su)->set vlan create 555
B2(su)->clear vlan egress 1 ge.2.1
B2(su)->set port vlan ge.2.1 555 untagged
B2(su)->show port vlan ge.2.1
ge.2.1 is set to 555
```

Note: If you preconfigure a virtual switch and then add a physical switch of a different type to the stack as that unit number, any configured functionality that cannot be supported on the physical switch will cause a configuration mismatch status for that device and the ports of the new device will join detached. You must clear the mismatch before the new device will properly join the stack.

Considerations About Using Clear Config in a Stack

When using the **clear config** command (page 3-49) to clear configuration parameters in a stack, it is important to remember the following:

- Use **clear config** to clear config parameters without clearing stack unit IDs. This command WILL NOT clear stack parameters or the IP address and avoids the process of renumbering the stack.

- Use **clear config all** when it is necessary to clear all config parameters, including stack unit IDs and switch priority values. This command will not clear the IP address nor will it remove an applied advanced feature license.
- Use **clear ip address** to remove the IP address of the stack.
- Use **clear license** to remove an applied license from a switch.

Configuration parameters and stacking information can also be cleared **on the master unit only** by selecting the "restore configuration to factory defaults" option from the boot menu on switch startup. This selection will leave stacking priorities on all other units.

Issues Related to Mixed Type Stacks

Feature Support

Because the SecureStack B2 and B3 switches have different hardware architectures, the functionality supported by the two switch types is different. When the two types of switches are mixed in a stack, the functionality supported will be the lowest common denominator of features supported on all platforms. Refer to the firmware Release Notes for information about supported features.

Configuration

Common Firmware Version

Mixed stacking is only supported by SecureStack B2 firmware version 4.00.xx and higher. In order to mix SecureStack B3 switches with B2 switches, you must install the B2 firmware (version 4.00.xx or higher) on the B3 switch. You can install the B2 firmware first, with the B3 switch in stand-alone mode, or you can add the B3 switch to the stack and then copy the B2 firmware to the B3 switch using the set switch copy-fw command (page 2-9). After copying the B2 firmware to the B3 switch, you must reset the stack.

Switch Manager

It is recommended that a SecureStack B3 switch be made the manager of a mixed stack. Use the set switch movemanagement command (page 2-10) to change the manager unit.

Stacking Configuration and Management Commands

Purpose

To review, individually configure and manage switches in a SecureStack B2 stack.

Commands

For information about...	Refer to page...
show switch	2-6
show switch switchtype	2-7

For information about...	Refer to page...
show switch stack-ports	2-8
set switch	2-9
set switch copy-fw	2-9
set switch description	2-10
set switch movemanagement	2-10
set switch member	2-11
clear switch member	2-11

show switch

Use this command to display information about one or more units in the stack.

Syntax

show switch [status] [*unit*]

Parameters

status	(Optional) Displays power and administrative status information for one or more units in the stack.
unit	(Optional) Specifies the unit(s) for which information will display.

Defaults

If not specified, status and other configuration information about all units will be displayed.

Mode

Switch command, read-only.

Usage

After a stack has been configured, you can use this command to physically confirm the identity of each unit. When you enter the command with a unit number, the MGR LED of the specified switch will blink for 10 seconds. The normal state of this LED is off for member units and steady green for the manager unit.

Examples

This example shows how to display information about all switch units in the stack:

```
B2(rw)->show switch
        Management    Preconfig     Plugged-in         Switch          Code
Switch    Status      Model ID      Model ID           Status         Version
------ ------------ ------------- ------------- --------------------- --------
1      Mgmt Switch  B2G124-24     B2G124-24     OK                    04.02.xx
2      Stack Member B2G124-24     B2G124-24     OK                    04.02.xx
3      Stack Member B2G124-24     B2G124-24     OK                    04.02.xx
4      Stack Member B2G124-24     B2G124-24     OK                    04.02.xx
5      Stack Member B2G124-24     B2G124-24     OK                    04.02.xx
6      Stack Member B2G124-24     B2G124-24     OK                    04.02.xx
7      Stack Member B2G124-24     B2G124-24     OK                    04.02.xx
```

```
8      Stack Member B2G124-24     B2G124-24     OK                    04.02.xx
```

This example shows how to display information about switch unit 1 in the stack:

```
B2(ro)->show switch 1
Switch                            1
Management Status                 Management Switch
Hardware Management Preference    Unassigned
Admin Management Preference       Unassigned
Switch Type                       B2G124-24
Preconfigured Model Identifier    B2G124-24
Plugged-in Model Identifier       B2G124-24
Switch Status                     OK
Switch Description                Enterasys Networks, Inc. B2 -- Model
                                  B2G124-24
Detected Code Version             04.02.xx
Detected Code in Flash            03.01.20
Detected Code in Back Image       02.01.37
Up Time                           0 days 6 hrs 37 mins 54 secs
```

This example shows how to display status information for switch unit 1 in the stack:

```
B2(ro)->show switch status 1
Switch                            1
Switch Status                     Full
Admin State
Power State
Inserted Switch:
   Model Identifier               B2G124-24
   Description                    Enterasys Networks, Inc. B2 -- Model
                                  B2G124-24
Configured Switch:
   Model Identifier               B2G124-24
   Description                    Enterasys Networks, Inc. B2 -- Model
                                  B2G124-24
```

show switch switchtype

Use this command to display information about supported switch types in the stack.

Syntax

show switch switchtype [*switchindex*]

Parameters

switchindex	(Optional) Specifies the switch index (SID) of the switch type to display.

Defaults

None.

Mode

Switch command, read-only.

Examples

This example shows how to display switch type information about all switches in the stack:

```
B2(su)->show switch switchtype
```

```
                                    Mgmt   Code
SID         Switch Model ID         Pref  Version
--- ------------------------------ ---- ---------
1   B2G124-24                      1    0xa08245
2   B2G124-48                      1    0xa08245
3   B2G124-48P                     1    0xa08245
4   B2H124-48                      1    0xa08245
5   B2H124-48P                     1    0xa08245
```

This example shows how to display switch type information about SID1:

```
B2(rw)->show switch switchtype 1
Switch Type..................... 0x56950200
Model Identifier................ B2G124-24
Switch Description.............. Enterasys Networks, Inc. B2 -- Model
                                 B2G124-24
Management Preference........... 1
Expected Code Version........... 0xa08245

Supported Cards:
   Slot......................... 0
   Card Index (CID)............. 1
   Model Identifier............. B2G124-24
```

show switch stack-ports

Use this command to display various data flow and error counters on stack ports.

Syntax

show switch stack-ports [*unit*]

Parameters

unit	(Optional) Specifies the switch unit ID, an integer ranging from 1 to 8.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display data and error information on stack ports:

```
B2(ro)->show switch stack-ports
                   ------------TX-------------- ------------RX-----------
                   Data    Error                Data    Error
        Stacking   Rate    Rate      Total      Rate    Rate      Total
Switch    Port    (Mb/s) (Errors/s)  Errors    (Mb/s) (Errors/s)  Errors
------ ---------- ------ ---------- ---------- ------ ---------- --------
1      Up         0      0          0          0      0          0
       Down       0      0          0          0      0          0
```

set switch

Use this command to assign a switch ID, to set a switch's priority for becoming the management switch if the previous management switch fails, or to change the switch unit ID for a switch in the stack.

Syntax

set switch {*unit* [**priority** *value* | **renumber** *newunit*]}

Parameters

unit	Specifies a unit number for the switch. Value can range from 1 to 8.
priority *value*	Specifies a priority value for the unit. Valid values are 1 to 15 with higher values assigning higher priority.
renumber *newunit*	Specifies a new number for the unit. **Note:** This number must be a previously unassigned unit ID number.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example shows how to assign priority 3 to switch 5:

```
B2(su)->set switch 5 priority 3
```

This example shows how to renumber switch 5 to switch 7:

```
B2(su)->set switch 5 renumber 7
```

set switch copy-fw

Use this command to replicate the code image file from the management switch to other switch(es) in the stack.

Syntax

set switch copy-fw [**destination-system** *unit*]

Parameters

destination-system *unit*	(Optional) Specifies the unit number of unit on which to copy the management image file.

Defaults

If **destination-system** is not specified, the management image file will be replicated to all switches in the stack.

Mode

Switch command, read-write.

Example

This example shows how to replicate the management image file to all switches in the stack:

```
B2(su)->set switch copy-fw
 Are you sure you want to copy firmware? (y/n) y

 Code transfer completed successfully.
```

set switch description

Use this command to assign a name to a switch in the stack.

Syntax

`set switch description` *`unit description`*

Parameters

unit	Specifies a unit number for the switch.
description	Specifies a text description for the unit.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to assign the name “FirstUnit” to switch unit 1 in the stack:

```
B2(su)->set switch description 1 FirstUnit
```

set switch movemanagement

Use this command to move management switch functionality from one switch to another.

Syntax

`set switch movemanagement` *`fromunit tounit`*

Parameters

fromunit	Specifies the unit number of the current management switch.
tounit	Specifies the unit number of the newly-designated management switch.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to move management functionality from switch 1 to switch 2:

```
B2(su)->set switch movemenagement 1 2
Moving stack management will unconfigure entire stack including all interfaces.
Are you sure you want to move stack management? (y/n) y
```

set switch member

Use this command to add a virtual member to a stack. This allows you to preconfigure a switch before the physical device is actually added to the stack.

Syntax

set switch member *unit switch-id*

Parameters

unit	Specifies a unit number for the switch.
switch-id	Specifies a switch ID (SID) for the switch. SIDs can be displayed with the show switch switchtype command.

Defaults

None.

Mode

Switch command, read-write.

Usage

Refer to "Creating a Virtual Switch Configuration" on page 2-3 for more information about how to add a virtual switch to a stack.

Example

This example shows how to specify a switch as unit 1 with a switch ID of 1:

```
B2(su)->set switch member 1 1
```

clear switch member

Use this command to remove a member entry from the stack.

Syntax

clear switch member *unit*

Parameters

unit	Specifies the unit number of the switch.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to remove the switch 5 entry from the stack:

```
B2(su)->clear switch member 5
```

3

Basic Configuration

At startup, the SecureStack B2 switch is configured with many defaults and standard features. This chapter describes how to customize basic system settings to adapt to your work environment.

For information about...	Refer to page...
Quick Start Setup Commands	3-1
Setting User Accounts and Passwords	3-2
Setting Basic Switch Properties	3-9
Downloading a Firmware Image	3-30
Reviewing and Selecting a Boot Firmware Image	3-33
Starting and Configuring Telnet	3-35
Managing Switch Configuration and Files	3-37
Clearing and Closing the CLI	3-47
Resetting the Switch	3-48
Using and Configuring WebView	3-50
Gathering Technical Support Information	3-52

Quick Start Setup Commands

The tables in this section provide a quick reference for the CLI commands needed to begin basic B2 switch operation. Table 3-1 lists tasks and their associated CLI commands required for setting up the switch with the latest firmware. Table 3-2 lists optional CLI commands that will help you perform additional basic configuration on the switch. Refer to the pages listed for more information about each command.

Table 3-1 Required CLI Setup Commands

Step	Task	CLI commands	Refer to page...
1	Set a new password.	**set password** [*username*]	3-5
2	Set the switch IP address.	**set ip address** *ip-address* [**mask** *ip-mask*] [**gateway** *ip-gateway*]	3-11
3	Download, activate, and verify new firmware on the switch using TFTP copy.	**copy tftp://***tftp_server_ip_address/filename* **system:image**	3-43
		set boot system *filename*	3-34
		show version	3-25

Table 3-2 Optional CLI Setup Commands

Task	CLI commands	Refer to page...
Save the active configuration.	**save config**	3-39
Enable or disable SSH.	**set ssh enable** | **disable**	19-73
Enable or disable Telnet.	**set telnet** {**enable** | **disable**} [**inbound** | **outbound** | **all**]	3-36
Enable or disable HTTP management (WebView).	**set webview** {**enable** | **disable**}	3-51
Enable or disable SNMP port link traps.	**set port trap** *port-string* {**enable** | **disable**}	7-22
Set the per port broadcast limit	**set port broadcast** *port-string threshold-value*	7-31
Configure a VLAN.	**set vlan create** *vlan-id*	10-5
	set port vlan *port-string vlan-id* **modify-egress**	10-9
Set a Syslog server IP and severity	**set logging server** *index* **ip-addr** *ip-addr* **severity** *severity* **state enable**	10-9
Configure and enable a RADIUS server.	**set radius server** *index ip-addr port* [*secret-value*]{**realm** {**management-access** | **any** | **network-access**}	19-5
	set radius enable	19-5

Setting User Accounts and Passwords

Purpose

To change the switch's default user login and password settings, and to add new user accounts and passwords.

Commands

For information about...	Refer to page...
show system login	3-3
set system login	3-4
clear system login	3-4
set password	3-5
set system password length	3-6
set system password aging	3-6
set system password history	3-7
show system lockout	3-7
set system lockout	3-8

show system login

Use this command to display user login account information.

Syntax

show system login

Parameters

None.

Defaults

None.

Mode

Switch command, super user.

Example

This example shows how to display login account information. In this case, switch defaults have not been changed:

```
B2(su)->show system login
Password history size: 0
Password aging       : disabled

Username        Access      State

admin           super-user  enabled
ro              read-only   enabled
rw              read-write  enabled
```

Table 3-1 provides an explanation of the command output.

Table 3-1 show system login Output Details

Output Field	What It Displays...
Password history size	Number of previously used user login passwords that will be checked for duplication when the set password command is executed. Configured with set system password history (page 3-7).
Password aging	Number of days user passwords will remain valid before aging out. Configured with set system password aging (page 3-6).
Username	Login user names.
Access	Access assigned to this user account: super-user, read-write or read-only.
State	Whether this user account is enabled or disabled.

set system login

Use this command to create a new user login account, or to disable or enable an existing account. The SecureStack B2 switch supports up to 16 user accounts, including the **admin** account, which cannot be deleted.

Syntax

set system login *username* {**super-user** | **read-write** | **read-only**} {**enable** | **disable**}

Parameters

username	Specifies a login name for a new or existing user. This string can be a maximum of 80 characters, although a maximum of 16 characters is recommended for proper viewing in the **show system login** display.
super-user | **read-write** | **read-only**	Specifies the access privileges for this user.
enable | **disable**	Enables or disables the user account.

Defaults

None.

Mode

Switch command, super user.

Usage

Login accounts, including the **admin** user account, can be locked out after multiple failed attempts to log in to the system. Refer to "show system lockout" on page 3-7 and "set system lockout" on page 3-8 for more information about lockout parameters.

If the **admin** user account has been locked out, you must wait until the configured lockout time period has expired or you can power cycle the switch to reboot it, which will re-enable the **admin** user account.

Example

This example shows how to enable a new user account with the login name "netops" with super user access privileges:

```
B2(su)->set system login netops super-user enable
```

clear system login

Use this command to remove a local login user account.

Syntax

clear system login *username*

Parameters

username	Specifies the login name of the account to be cleared. **Note:** The default admin (su) account cannot be deleted.

Defaults

None.

Mode

Switch command, super user.

Example

This example shows how to remove the “netops” user account:

```
B2(su)->clear system login netops
```

set password

Use this command to change system default passwords or to set a new login password on the CLI.

Syntax

set password [*username*]

Parameters

username	(Only available to users with super-user access.) Specifies a system default or a user-configured login account name. By default, the SecureStack B2 switch provides the following account names: **ro** for Read-Only access. **rw** for Read-Write access. **admin** for Super User access. (This access level allows Read-Write access to all modifiable parameters, including user accounts.)

Defaults

None.

Mode

Switch command, read-write.

Switch command, super-user.

Usage

Read-Write users can change their own passwords.

Super Users (Admin) can change any password on the system.

If you forget the password for the **admin** user account, you can reset the password to the default password value by pressing the password reset button on the switch.

Examples

This example shows how a super-user would change the Read-Write password from the system default (blank string):

```
B2(su)->set password rw
Please enter new password: ********
Please re-enter new password: ********
Password changed.
B2(su)->
```

This example shows how a user with Read-Write access would change his password:

```
B2(su)->set password
Please enter old password: ********
Please enter new password: ********
Please re-enter new password: ********
Password changed.
B2(su)->
```

set system password length

Use this command to set the minimum user login password length.

Syntax

set system password length *characters*

Parameters

characters	Specifies the minimum number of characters for a user account password. Valid values are 0 to 40.

Defaults

None.

Mode

Switch command, super user.

Example

This example shows how to set the minimum system password length to 8 characters:

```
B2(su)->set system password length 8
```

set system password aging

Use this command to set the number of days user passwords will remain valid before aging out, or to disable user account password aging.

Syntax

set system password aging {*days* | **disable**}

Parameters

days	Specifies the number of days user passwords will remain valid before aging out. Valid values are 1 to 365.
disable	Disables password aging.

Defaults

None.

Mode

Switch command, super user.

Example

This example shows how to set the system password age time to 45 days:

```
B2(su)->set system password aging 45
```

set system password history

Use this command to set the number of previously used user login passwords that will be checked for password duplication. This prevents duplicate passwords from being entered into the system with the **set password** command.

Syntax

set system password history *size*

Parameters

size	Specifies the number of passwords checked for duplication. Valid values are 0 to 10.

Defaults

None.

Mode

Switch command, super user.

Example

This example shows how to configure the system to check the last 10 passwords for duplication

```
B2(su)->set system password history 10
```

show system lockout

Use this command to display settings for locking out users after failed attempts to log in to the system.

Syntax

show system lockout

Parameters

None.

Defaults

None.

Mode

Switch command, super user.

Example

This example shows how to display user lockout settings. In this case, switch defaults have not been changed:

```
B2(su)->show system lockout
Lockout attempts: 3
Lockout time:     15 minutes.
```

Table 3-3 provides an explanation of the command output. These settings are configured with the **set system lockout** command ("set system lockout" on page 3-8).

Table 3-3 show system lockout Output Details

Output Field	What It Displays...
Lockout attempts	Number of failed login attempts allowed before a read-write or read-only user's account will be disabled.
Lockout time	Number of minutes the default admin user account will be locked out after the maximum login attempts.

set system lockout

Use this command to set the number of failed login attempts before locking out (disabling) a read-write or read-only user account, and the number of minutes to lockout the default admin super user account after maximum login attempts.

Syntax

set system lockout {[**attempts** *attempts*] [**time** *time*]}

Parameters

attempts *attempts*	Specifies the number of failed login attempts allowed before a read-write or read-only user's account will be disabled. Valid values are 1 to 10.
time *time*	Specifies the number of minutes the default admin user account will be locked out after the maximum login attempts. Valid values are 0 to 60.

Defaults

None.

Mode

Switch command, super user.

Usage

Once a user account is locked out, it can only be re-enabled by a super user with the **set system login** command (page 3-4).

If the default admin super user account has been locked out, you can wait until the lock out time has expired or you can reset the switch in order to re-enable the admin account.

Example

This example shows how to set login attempts to 5 and lockout time to 30 minutes:

```
B2(su)->set system lockout attempts 5 time 30
```

Setting Basic Switch Properties

Purpose

To display and set the system IP address and other basic system (switch) properties.

Commands

For information about...	Refer to page...
show ip address	3-10
set ip address	3-11
clear ip address	3-11
show ip protocol	3-12
set ip protocol	3-12
show system	3-13
show system hardware	3-14
show system utilization	3-15
show system enhancedbuffermode	3-16
set system enhancedbuffermode	3-16
set system temperature	3-17
clear system temperature	3-18
show time	3-19
set time	3-19
show summertime	3-20
set summertime	3-20
set summertime date	3-21
set summertime recurring	3-21
clear summertime	3-22
set prompt	3-23

For information about...	Refer to page...
show banner motd	3-23
set banner motd	3-24
clear banner motd	3-24
show version	3-25
set system name	3-26
set system location	3-26
set system contact	3-27
set width	3-27
set length	3-28
show logout	3-28
set logout	3-29
show console	3-29
set console baud	3-30

show ip address

Use this command to display the system IP address and subnet mask.

Syntax

show ip address

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the system IP address and subnet mask:

```
B2(su)->show ip address
Name                    Address                 Mask
----------------        ----------------        ----------------
host                    10.42.13.20             255.255.0.0
```

set ip address

Use this command to set the system IP address, subnet mask and default gateway.

Note: The B2 does not support the ability for a user to configure the host's gateway to be a local routed interface IP. The host's gateway must exist on a different device in the network if one is configured.

Syntax

set ip address *ip-address* [**mask** *ip-mask*] [**gateway** *ip-gateway*]

Parameters

ip-address	Sets the IP address for the system. For SecureStack B2 systems, this is the IP address of the management switch as described in "About SecureStack B2 Switch Operation in a Stack" on page 2-1.
mask *ip-mask*	(Optional) Sets the system's subnet mask.
gateway *ip-gateway*	(Optional) Sets the system's default gateway (next-hop device).

Defaults

If not specified, *ip-mask* will be set to the natural mask of the *ip-address* and *ip-gateway* will be set to the *ip-address*.

Mode

Switch command, read-write.

Usage

Parameters must be entered in the order shown (host IP, then mask, then gateway) for the command to be accepted.

Example

This example shows how to set the system IP address to 10.1.10.1 with a mask of 255.255.128.0:

```
B2(su)->set ip address 10.1.10.1 mask 255.255.128.0
```

clear ip address

Use this command to clear the system IP address.

Syntax

clear ip address

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the system IP address:

```
B2(rw)->clear ip address
```

show ip protocol

Use this command to display the method used to acquire a network IP address for switch management.

Syntax

`show ip protocol`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the method used to acquire a network IP address:

```
B2(su)->show ip protocol
System IP address acquisition method: dhcp
```

set ip protocol

Use this command to specify the protocol used to acquire a network IP address for switch management.

Syntax

`set ip protocol {bootp | dhcp | none}`

Parameters

bootp	Selects BOOTP as the protocol to use to acquire the system IP address.
dhcp	Selects DHCP as the protocol to use to acquire the system IP address.
none	No protocol will be used to acquire the system IP address.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the method used to acquire a network IP address to DHCP.

```
B2(su)->set ip protocol dhcp
```

show system

Use this command to display system information, including contact information, power and fan tray status and uptime.

Syntax

show system

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display system information:

```
B2(su)->show system
System contact:
System location:
System name:

Switch 1
--------
PS1-Status                      PS2-Status
----------                      ----------
Ok                              Not Installed and/or Not Operating

Fan1-Status                     Fan2-Status
-----------                     -----------
Ok                              Ok

Temp-Alarm
-----------
off
Thermal Threshold: 58%
Temp alarm max threshold:  100%
Temp alarm trap: disabled
Temp alarm syslog: disabled

Uptime d,h:m:s  Logout
--------------  -------
0,20:36:49      0 min
```

The following table provides an explanation of the command output.

Table 3-4 show system Output Details

Output	What It Displays...
System contact	Contact person for the system. Default of a blank string can be changed with the **set system contact** command (“set system contact” on page 3-27).
System location	Where the system is located. Default of a blank string can be changed with the **set system location** command (“set system location” on page 3-26).
System name	Name identifying the system. Default of a blank string can be changed with the **set system name** command (“set system name” on page 3-26).
Switch x	Indicates the switch position in the stack. When multiple switches are in a stack, information for each switch is displayed.
PS1-Status	Operational status for the primary power supply.
PS2-Status	Operational status for the secondary power supply, if installed.
Fan*x*-Status	Operational status of the fan(s).
Temp-Alarm	Indicates status of temperature alarm — on, off. The status will show NA (not available) on switches that do not support this functionality.
Thermal Threshold	Percentage of thermal threshold reached. The status will show NA (not available) on switches that do not support this functionality.
Temp alarm max threshold	The temperature alarm threshold expressed as a percentage of the maximum rated. The default value is 100%.
Temp alarm trap	Indicates whether the sending of temperature alarm traps is enabled or disabled. The default is disabled.
Temp alarm syslog	Indicates whether temperature alarm syslog messages are enabled or disabled. The default is disabled.
Uptime d,h:m:s	System uptime.
Logout	Time an idle console or Telnet CLI session will remain connected before timing out. Default of 5 minutes can be changed with the **set logout** command (“set logout” on page 3-29).

show system hardware

Use this command to display the system’s hardware configuration.

Syntax

```
show system hardware
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the system's hardware configuration. Please note that the information you see displayed may differ from this example.

```
B2(su)->show system hardware
        SLOT 1 HARDWARE INFORMATION
        ---------------------------
        Model:
        Serial Number:                  777777777777
        Vendor ID:                      0xbc00
        Base MAC Address:               00:11:88:B1:76:C0
        Hardware Version:               BCM56514 REV 1
        FirmWare Version:               01.00.00.0052
        Boot Code Version:              01.00.42
```

show system utilization

Use this command to display detailed information about the processor running on the switch, or the overall memory usage of the Flash and SDRAM storage devices on the unit, or the processes running on the switch. Only the memory usage in the master unit of a stack is shown.

Syntax

show system utilization {**cpu** | **storage** | **process**}

Parameters

cpu	Display information about the processor running on the switch.
storage	Display information about the overall memory usage on the switch.
process	Display information about the processes running on the switch.

Defaults

None.

Mode

Switch command, read-only.

Examples

This example shows how to display the system's CPU utilization:

```
B2(ro)->show system utilization cpu
Total CPU Utilization:

Switch   CPU       5 sec      1 min       5 min
-----------------------------------------------
1        1         50%        49%         49%
```

This example shows how to display the system's overall memory usage:

```
B2(ro)->show system utilization storage
Storage Utilization:
```

```
Type    Description               Size(Kb)       Available (Kb)
-------------------------------------------------------------
RAM     RAM device                  262144                97173
Flash   Images, Config, Other        31095                 8094
```

This example shows how to display information about the processes running on the system. Only partial output is shown.

```
B2(ro)->show system utilization process
Switch:1    CPU:1

 TID     Name                       5Sec     1Min     5Min
-------------------------------------------------------------
 c157930 ipMapForwardingTask      3.60%    3.02%    3.48%
 cc70000 RMONTask                 0.00%    0.00%    0.00%
 ccb0b60 SNMPTask                34.80%   34.06%   31.78%
 d4847a0 tEmWeb                   0.00%    0.03%    0.01%
 d4ca360 hapiRxTask               3.20%    4.80%    5.00%
 dec8600 lvl7TaskUtilMonitorTas   0.40%    0.40%    0.40%
 eb74120 bcmRX                    2.00%    2.91%    4.48%
 eb7fbc8 bcmLINK.0                0.40%    0.22%    0.32%
 f00c9a0 bcmTX                    0.00%    0.33%    0.53%
 f027648 bcmCNTR.0                0.00%    0.00%    0.03%
 f034858 bcmL2X.0                 0.00%    0.02%    0.04%
```

show system enhancedbuffermode

Use this command to display the status of enhanced buffer mode, which optimizes buffer distribution into a single CoS queue operation for standalone switches or non-stacked SecureStack switches.

Syntax

show system enhancedbuffermode

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to display enhanced buffer mode status:

```
B2(su)->show system enhancedbuffermode enable
Optimized system buffer distribution           Disable
```

set system enhancedbuffermode

Use this command to enable or disable enhanced buffer mode, which optimizes buffer distribution into a single CoS queue operation for standalone switches or non-stacked SecureStack

switches.. Executing this command will reset the switch, so the system prompts you to confirm whether you want to proceed.

Syntax

```
set system enhancedbuffermode {enable | disable}
```

Parameters

enable | **disable**	Enables or disables enhanced buffer mode.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable enhanced buffer mode:

```
B2(su)->set system enhancedbuffermode enable

Changes in the enhanced buffer mode will require resetting this unit.
Are you sure you want to continue? (y/n)
```

set system temperature

Use this command to set the system high temperature threshold limit and the high temperature alert parameters, on the platforms that support this feature.

Syntax

```
set system temperature {[syslog enable | disable] [trap enable | disable]
[overtemp-threshold value]}
```

Parameters

syslog enable | **disable**	Enables or disables logging high temperature alerts to the system log when the system transitions into an alarm state.
trap enable | **disable**	Enables or disables sending high temperature alerts by means of SNMP traps when the system transitions into an alarm state.
overtemp-threshold *value*	Sets the thermal threshold as a percentage of the maximum rated for the specific platform. Value can range from 0 to 100%.

Defaults

Syslog alerts are disabled by default.

Trap alerts are disabled by default.

Overtemp threshold is 100% by default.

Mode

Switch command, read-write.

Usage

On the platforms that support this feature, temperature sensors are located in several different locations within the device. Threshold calibrations have been calculated separately for each platform. The thermal overtemp threshold is the high-water mark that, when reached, triggers an alert to warn the system administrator that the device is operating at high temperatures.

The values set with this command can be viewed with the **show system** command.

Refer to the Release Note for your platform to determine if this feature is supported on your platform.

Example

The following example enables sending SNMP traps and sets the overtemp threshold to 60%.

```
B2(su)->set system temperature trap enable overtemp-threshold 60
```

clear system temperature

Use this command to reset system high temperature parameters to their default values, on the platforms that support this feature.

Syntax

`clear system temperature`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Usage

This command resets all the high temperature parameters to their default values:

- Syslog alerts are disabled by default.
- Trap alerts are disabled by default.
- Overtemp threshold is 100% by default.

Example

This example resets all high temperature parameters to their defaults.

```
B2(su)->clear system temperature
```

show time

Use this command to display the current time of day in the system clock.

Syntax

show time

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the current time. The output shows the day of the week, month, day, and the time of day in hours, minutes, and seconds and the year:

```
B2(su)->show time
THU SEP 05 09:21:57 2002
```

set time

Use this command to change the time of day on the system clock.

Syntax

set time [*mm/dd/yyyy*] [*hh:mm:ss*]

Parameters

[*mm/dd/yyyy*] [*hh:mm:ss*]	Sets the time in: month, day, year and/or 24-hour format At least one set of time parameters must be entered.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the system clock to 7:50 a.m:

```
B2(su)->set time 7:50:00
```

show summertime

Use this command to display daylight savings time settings.

Syntax

show summertime

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display daylight savings time settings:

```
B2(su)->show summertime
Summertime is disabled and set to ''
Start : SUN APR 04 02:00:00 2004
End   : SUN OCT 31 02:00:00 2004
Offset: 60 minutes (1 hours 0 minutes)
Recurring: yes, starting at 2:00 of the first Sunday of April and ending at 2:00
 of the last Sunday of October
```

set summertime

Use this command to enable or disable the daylight savings time function.

Syntax

set summertime {**enable** | **disable**} [*zone*]

Parameters

enable | **disable**	Enables or disables the daylight savings time function.
zone	(Optional) Applies a name to the daylight savings time settings.

Defaults

If a *zone* name is not specified, none will be applied.

Mode

Switch command, read-only.

Example

This example shows how to enable daylight savings time function:

```
B2(su)->set summertime enable
```

set summertime date

Use this command to configure specific dates to start and stop daylight savings time. These settings will be non-recurring and will have to be reset annually.

Syntax

set summertime date *start_month start_date start_year start_hr_min end_month end_date end_year end_hr_min* [*offset_minutes*]

Parameters

start_month	Specifies the month of the year to start daylight savings time.
start_date	Specifies the day of the month to start daylight savings time.
start_year	Specifies the year to start daylight savings time.
start_hr_min	Specifies the time of day to start daylight savings time. Format is hh:mm.
end_month	Specifies the month of the year to end daylight savings time.
end_date	Specifies the day of the month to end daylight savings time.
end_year	Specifies the year to end daylight savings time.
end_hr_min	Specifies the time of day to end daylight savings time. Format is hh:mm.
offset_minutes	(Optional) Specifies the amount of time in minutes to offset daylight savings time from the non-daylight savings time system setting. Valid values are 1 - 1440.

Defaults

If an *offset* is not specified, none will be applied.

Mode

Switch command, read-write.

Example

This example shows how to set a daylight savings time start date of April 4, 2004 at 2 a.m. and an ending date of October 31, 2004 at 2 a.m. with an offset time of one hour:

```
B2(su)->set summertime date April 4 2004 02:00 October 31 2004 02:00 60
```

set summertime recurring

Use this command to configure recurring daylight savings time settings. These settings will start and stop daylight savings time at the specified day of the month and hour each year and will not have to be reset annually.

Syntax

set summertime recurring *start_week start_day start_month start_hr_min end_week end_day end_month end_hr_min* [*offset_minutes*]

Parameters

start_week	Specifies the week of the month to restart daylight savings time. Valid values are: first, second, third, fourth, and last.
start_day	Specifies the day of the week to restart daylight savings time.
start_hr_min	Specifies the time of day to restart daylight savings time. Format is hh:mm.
end_week	Specifies the week of the month to end daylight savings time.
end_day	Specifies the day of the week to end daylight savings time.
end_hr_min	Specifies the time of day to end daylight savings time. Format is hh:mm.
offset_minutes	(Optional) Specifies the amount of time in minutes to offset daylight savings time from the non-daylight savings time system setting. Valid values are 1 - 1440.

Defaults

If an *offset* is not specified, none will be applied.

Mode

Switch command, read-write.

Example

This example shows how set daylight savings time to recur starting on the first Sunday of April at 2 a.m. and ending the last Sunday of October at 2 a.m. with an offset time of one hour:

```
B2(su)->set summertime recurring first Sunday April 02:00 last Sunday October
02:00 60
```

clear summertime

Use this command to clear the daylight savings time configuration.

Syntax

`clear summertime`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the daylight savings time configuration:

```
B2(su)->clear summertime
```

set prompt

Use this command to modify the command prompt.

Syntax

set prompt *prompt_string*

Parameters

prompt_string	Specifies a text string for the command prompt.

Note: A prompt string containing a space in the text must be enclosed in quotes as shown in the example below.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the command prompt to Switch 1:

```
B2(su)->set prompt “Switch 1”
Switch 1(su)->
```

show banner motd

Use this command to show the banner message of the day that will display at session login.

Syntax

show banner motd

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the banner message of the day:

```
B2(rw)->show banner motd
        This system belongs to XYZ Corporation.
Use of this system is strictly limited to authorized personnel.
```

set banner motd

Use this command to set the banner message of the day displayed at session login.

Note: Banner message text must be enclosed in beginning and ending double quotation marks. The message itself cannot contain any additional double quotation marks.

Syntax

`set banner motd` *`message`*

Parameters

message	Specifies a message of the day. This is a text string that needs to be in double quotes if any spaces are used. Use a `\n` for a new line and `\t` for a tab (eight spaces).

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the message of the day banner to read: "This system belongs to XYZ Corporation. Use of this system is strictly limited to authorized personnel."

```
B2(rw)->set banner motd "\tThis system belongs to XYZ Corporation.\nUse of this
system is strictly limited to authorized personnel."
```

clear banner motd

Use this command to clear the banner message of the day displayed at session login to a blank string.

Syntax

`clear banner motd`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the message of the day banner to a blank string:

```
B2(rw)->clear banner motd
```

show version

Use this command to display hardware and firmware information. Refer to "Downloading a Firmware Image" on page 3-30 for instructions on how to download a firmware image.

Syntax

show version

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display version information. Please note that you may see different information displayed, depending on the type of hardware.

```
B2(su)->show version
Copyright (c) 2007 by Enterasys Networks, Inc.

 Model            Serial #            Versions
--------------  -----------------  -------------------
B2G124-48P       001188021035       Hw:BCM5665 REV 17
                                    Bp:01.00.29
                                    Fw:4.02.xx
                                    BuFw:03.01.13
                                    PoE:500_3
```

Table 3-5 provides an explanation of the command output.

Table 3-5 show version Output Details

Output Field	What It Displays...
Model	Switch's model number.
Serial #	Serial number of the switch.
Versions	• Hw: Hardware version number. • Bp: BootPROM version. • Fw: Current firmware version number. • BuFw: Backup firmware version number. • PoE: Power over Ethernet driver version. (Displays only for PoE switches.)

set system name

Use this command to configure a name for the system.

Syntax

set system name [*string*]

Parameters

string	(Optional) Specifies a text string that identifies the system. **Note:** A name string containing a space in the text must be enclosed in quotes as shown in the example below.

Defaults

If *string* is not specified, the system name will be cleared.

Mode

Switch command, read-write.

Example

This example shows how to set the system name to Information Systems:

```
B2(su)->set system name “Information Systems”
```

set system location

Use this command to identify the location of the system.

Syntax

set system location [*string*]

Parameters

string	(Optional) Specifies a text string that indicates where the system is located. **Note:** A location string containing a space in the text must be enclosed in quotes as shown in the example below.

Defaults

If *string* is not specified, the location name will be cleared.

Mode

Switch command, read-write.

Example

This example shows how to set the system location string:

```
B2(su)->set system location “Bldg N32-04 Closet 9”
```

set system contact

Use this command to identify a contact person for the system.

Syntax

set system contact [*string*]

Parameters

string	(Optional) Specifies a text string that contains the name of the person to contact for system administration. **Note:** A contact string containing a space in the text must be enclosed in quotes as shown in the example below.

Defaults

If *string* is not specified, the contact name will be cleared.

Mode

Switch command, read-write.

Example

This example shows how to set the system contact string:

```
B2(su)->set system contact “Joe Smith”
```

set width

Use this command to set the number of columns for the terminal connected to the switch’s console port.

Syntax

set width *screenwidth [default]*

Parameters

screenwidth	Sets the number of terminal columns. Valid values are 50 to 150.
default	(Optional) Makes this setting persistent for all future sessions (written to NV-RAM).

Defaults

None.

Mode

Switch command, read-write.

Usage

The number of rows of CLI output displayed is set using the **set length** command as described in “set length” on page 3-28.

Example

This example shows how to set the terminal columns to 50:

```
B2(su)->set width 50
```

set length

Use this command to set the number of lines the CLI will display. This command is persistent (written to NV-RAM).

Syntax

set length *screenlength*

Parameters

screenlength	Sets the number of lines in the CLI display. Valid values are 0, which disables the scrolling screen feature described in "Displaying Scrolling Screens" on page 1-8, and from 5 to 512.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the terminal length to 50:

```
B2(su)->set length 50
```

show logout

Use this command to display the time (in seconds) an idle console or Telnet CLI session will remain connected before timing out.

Syntax

show logout

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the CLI logout setting:

```
B2(su)->show logout
Logout currently set to: 10 minutes.
```

set logout

Use this command to set the time (in minutes) an idle console or Telnet CLI session will remain connected before timing out.

Syntax

set logout *timeout*

Parameters

timeout	Sets the number of minutes the system will remain idle before timing out.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the system timeout to 10 minutes:

```
B2(su)->set logout 10
```

show console

Use this command to display console settings.

Syntax

show console [baud] [bits] [flowcontrol] [parity] [stopbits]

Parameters

baud	(Optional) Displays the input/output baud rate.
bits	(Optional) Displays the number of bits per character.
flowcontrol	(Optional) Displays the type of flow control.
parity	(Optional) Displays the type of parity.
stopbits	(Optional) Displays the number of stop bits.

Defaults

If no parameters are specified, all settings will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display all console settings:

```
B2(su)->show console
Baud    Flow     Bits  StopBits    Parity
------  -------  ----  ----------  ------
9600    Disable  8     1           none
```

set console baud

Use this command to set the console port baud rate.

Syntax

set console baud *rate*

Parameters

rate	Sets the console baud rate. Valid values are: 300, 600, 1200, 2400, 4800, 5760, 9600, 14400, 19200, 38400, and 115200.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the console port baud rate to 19200:

```
B2(su)->set console baud 19200
```

Downloading a Firmware Image

You can upgrade the operational firmware in the SecureStack B2 switch without physically opening the switch or being in the same location. There are two ways to download firmware to the switch:

- Via TFTP download. This procedure uses a TFTP server connected to the network and downloads the firmware using the TFTP protocol. For details on how to perform a TFTP download using the **copy** command, refer to "copy" on page 3-43. For information on setting TFTP timeout and retry parameters, refer to "set tftp timeout" on page 3-45 and "set tftp retry" on page 3-46.
- Via the serial (console) port. This procedure is an out-of-band operation that copies the firmware through the serial port to the switch. It should be used in cases when you cannot connect the switch to perform the in-band **copy** download procedure via TFTP. Serial console download has been successfully tested with the following applications:
  - HyperTerminal Copyright 1999

– Tera Term Pro Version 2.3

Any other terminal applications may work but are not explicitly supported.

The B2 switch allows you to download and store dual images. The backup image can be downloaded and selected as the startup image by using the commands described in this section.

Downloading from a TFTP Server

To perform a TFTP download, proceed as follows:

1. If you have not already done so, set the switch's IP address using the **set ip address** command as detailed in "set ip address" on page 3-11.
2. Download a new image file using the **copy** command as detailed in "copy" on page 3-43.

Downloading via the Serial Port

To download switch firmware via the serial (console) port, proceed as follows:

1. With the console port connected, power up the switch. The following message displays:

```
Version 01.00.29 05-09-2005

Computing MD5 Checksum of operational code...
Select an option. If no selection in 2 seconds then
operational code will start.

1 - Start operational code.
2 - Start Boot Menu.
Select (1, 2):2

Password: *************
```

2. Before the boot up completes, type **2 to select "Start Boot Menu". Use "administrator" for the Password**.

Note: The "Boot Menu" password "administrator" can be changed using boot menu option 11.

```
Boot Menu Version 01.00.29 05-09-2005


Options available
1  - Start operational code
2  - Change baud rate
3  - Retrieve event log using XMODEM (64KB).
4  - Load new operational code using XMODEM
5  - Display operational code vital product data
6  - Run Flash Diagnostics
7  - Update Boot Code
8  - Delete operational code
9  - Reset the system
10 - Restore Configuration to factory defaults (delete config files)
11 - Set new Boot Code password
[Boot Menu] 2
```

3. Type **2**. The following baud rate selection screen displays:

```
1 - 1200
2 - 2400
3 - 4800
4 - 9600
5 - 19200
6 - 38400
7 - 57600
8 - 115200
0 - no change
```

4. Type **8** to set the switch baud rate to 115200. The following message displays:

```
Setting baud rate to 115200, you must change your terminal baud rate.
```

5. Set the terminal baud rate to **115200** and press ENTER.
6. From the boot menu options screen, type **4** to load new operational code using XMODEM. When the XMODEM transfer is complete, the following message and header information will display:

```
[Boot Menu] 4
Ready to receive the file with XMODEM/CRC....
Ready to RECEIVE File xcode.bin in binary mode
Send several Control-X characters to cCKCKCKCKCKCKCK

XMODEM transfer complete, checking CRC....
Verified operational code CRC.

The following Enterasys Header is in the image:

MD5 Checksum.....................fe967970996c4c8c43a10cd1cd7be99a
Boot File Identifier............0x0517
Header Version..................0x0100
Image Type......................0x82
Image Offset....................0x004d
Image length....................0x006053b3
Ident Strings Length............0x0028
Ident Strings...................
    B2G124-24
B2G124-48
B2H124-48
B2K124_24
Image Version Length............0x7
Image Version Bytes.............0x30 0x2e 0x35 0x2e 0x30 0x2e 0x34 (0.5.0.4)
```

7. From the boot menu options screen, type **2** to display the baud rate selection screen again.
8. Type **4** set the switch baud rate to **9600**. The following message displays:

```
Setting baud rate to 9600, you must change your terminal baud rate.
```

9. Set the terminal baud rate to **9600** and press ENTER.
10. From the boot menu options screen, type **1** to start the new operational code. The following message displays:

```
Operational Code Date: Tue Jun 29 08:34:05 2004
Uncompressing.....
```

Reverting to a Previous Image

In the event that you need to downgrade to a previous version of code, you can do so by completing the following steps as described in this chapter.

Caution: Before reverting to a previous image, always back up your configuration by saving it to a file (**show config outfile** on page 3-41). You can then copy the file to a remote location (**copy** on page 3-43).

Note: You will not be able to peform these steps remotely unless you have remote console support.

1. Save your running configuration with the **save config** command.
2. Make a copy of the current configuration with the **show config outfile configs/***filename* command. Use the **dir** command to confirm that the file was created.
3. If desired, copy the file to a remote TFTP server with the **copy** command:

   copy tftp://configs/*filename server_ipaddr/path and filename*
4. Load your previous version of code on the device, as described in "Downloading a Firmware Image" (page 3-30).
5. Set this older version of code to be the boot code with the set boot system command (page 3-34). When the system asks if you want to reset the device, specify no (**n**).
6. Reload the saved configuration onto the device with the **configure** command, described on page 3-42.
7. Reboot the system using the reset command (page 3-48).

Caution: If you do not follow the steps above, you may lose remote connectivity to the switch.

Reviewing and Selecting a Boot Firmware Image

Purpose

To display and set the image file the switch loads at startup. The B2 switch allows you to download and store a backup image, which can be selected as the startup image by using the commands described in this section.

Commands

For information about...	Refer to page...
show boot system	3-34
set boot system	3-34

show boot system

Use this command to display the firmware image the switch loads at startup.

Syntax

```
show boot system
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the switch's boot firmware image:

```
B2(su)->show boot system
Current system image to boot: bootfile
```

set boot system

Use this command to set the firmware image the switch loads at startup.

Syntax

set boot system *filename*

Parameters

filename	Specifies the name of the firmware image file.

Defaults

None.

Mode

Switch command, read-write.

Usage

This command allows you to set the firmware image to be loaded at startup. You can choose to reset the system to use the new firmware image immediately, or you can choose to only specify the new image to be loaded the next time the switch is rebooted.

You can use the **dir** command to display the "Active" image and the "Boot" image, which will be the image loaded at the next system reboot.

Note: If you are changing the firmware image to a version *earlier* than the current version, refer to "Reverting to a Previous Image" on page 3-33 for the correct steps to follow.

Example

This example shows how to set the boot firmware image file and reset the system.

```
B2(su)->set boot system b2_04.02.01.0005
This command requires resetting the entire system.
Do you want to continue (y/n) [n]?y

Checking firmware version
Saving Configuration
```

This example shows how to set the boot firmware image file to be used at the next reboot of the system, by answering "n" to the prompt. The **dir** command is then executed to display the Active and Boot images.

```
B2(su)->set boot system b2_04.02.03.0007
This command can optionally reset the system to boot the new image.
Do you want to reset now (y/n) [n]?n

B2(su)->dir
Images:
=====================================================================
Filename:      b2_04.02.00.0026 (Active)
Version:        04.02.00.0026
Size:              9405440 (bytes)
Date:             Fri Jul 18 12:48:35 2008
CheckSum:    f1626ccf10d8f48cd6c3e79ab602342a
Compatibility: <platform specific>

Filename:      b2_04.02.03.0007 (Boot)
Version:        04.02.03.0007
Size:              8290304 (bytes)
Date:             Fri May  9 11:35:27 2008
CheckSum:    9f820d79239f10890442f8ff1f2bc914
Compatibility: <platform specific>
```

Starting and Configuring Telnet

Purpose

To enable or disable Telnet, and to start a Telnet session to a remote host. The SecureStack B2 switch allows a total of four inbound and / or outbound Telnet session to run simultaneously.

Commands

For information about...	Refer to page...
show telnet	3-36
set telnet	3-36
telnet	3-37

show telnet

Use this command to display the status of Telnet on the switch.

Syntax

show telnet

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display Telnet status:

```
B2(su)->show telnet
Telnet inbound is currently: ENABLED
Telnet outbound is currently: ENABLED
```

set telnet

Use this command to enable or disable Telnet on the switch.

Syntax

set telnet {**enable** | **disable**} [**inbound** | **outbound** | **all**]

Parameters

enable | **disable**	Enables or disables Telnet services.
inbound | **outbound** | **all**	(Optional) Specifies inbound service (the ability to Telnet to this switch), outbound service (the ability to Telnet to other devices), or all (both inbound and outbound).

Defaults

If not specified, both inbound and outbound Telnet service will be enabled.

Mode

Switch command, read-write.

Example

This example shows how to disable inbound and outbound Telnet services:

```
B2(su)->set telnet disable all
Disconnect all telnet sessions and disable now (y/n)? [n]: y
All telnet sessions have been terminated, telnet is now disabled.
```

telnet

Use this command to start a Telnet connection to a remote host. The SecureStack B2 switch allows a total of four inbound and / or outbound Telnet session to run simultaneously.

Syntax

telnet *host* [*port*]

Parameters

host	Specifies the name or IP address of the remote host.
port	(Optional) Specifies the server port number.

Defaults

If not specified, the default *port* number 23 will be used.

Mode

Switch command, read-write.

Example

This example shows how to start a Telnet session to a host at 10.21.42.13:

```
B2(su)->telnet 10.21.42.13
```

Managing Switch Configuration and Files

Configuration Persistence Mode

The default state of configuration persistence mode is "auto," which means that when CLI configuration commands are entered, or when a configuration file stored on the switch is executed, the configuration is saved to NVRAM automatically at the following intervals:

- On a standalone unit, the configuration is checked every two minutes and saved if there has been a change.
- On a stack, the configuration is saved across the stack every 30 minutes if there has been a change.

If you want to save a running configuration to NVRAM more often than the automatic intervals, execute the **save config** command and wait for the system prompt to return. After the prompt returns, the configuration will be persistent.

You can change the persistence mode from "auto" to "manual" with the **set snmp persistmode** command. If the persistence mode is set to "manual," configuration commands will not be automatically written to NVRAM. Although the configuration commands will actively modify the running configuration, they will not persist across a reset unless the **save config** command has been executed.

Note: When your device is configured for manual SNMP persistence mode, and you attempt to change the boot system image, the device will not prompt you to save changes or warn you that changes will be lost.

Purpose

To set and view the persistence mode for CLI configuration commands, manually save the running configuration, view, manage, and execute configuration files and image files, and set and view TFTP parameters.

Commands

For information about...	Refer to page...
show snmp persistmode	3-38
set snmp persistmode	3-39
save config	3-39
dir	3-40
show file	3-41
show config	3-41
configure	3-42
copy	3-43
delete	3-44
show tftp settings	3-44
set tftp timeout	3-45
clear tftp timeout	3-45
set tftp retry	3-46
clear tftp retry	3-46

show snmp persistmode

Use this command to display the configuration persistence mode setting.

Syntax

```
show snmp persistmode
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Usage

By default, the mode is set to “auto save,” which automatically saves configuration changes at specific intervals. If the mode is set to “manual,” configuration commands are never automatically

saved. In order to make configuration changes persistent when the mode is manual, the **save config** command must be issued as described in "Configuration Persistence Mode" on page 3-37.

Example

This example shows how to display the configuration persistence mode setting. In this case, persistence mode is set to "manual", which means configuration changes are not being automatically saved.

```
B2(su)->show snmp persistmode
persistmode is manual
```

set snmp persistmode

Use this command to set the configuration persistence mode, which determines whether user-defined configuration changes are saved automatically, or require issuing the **save config** command. See "Configuration Persistence Mode" on page 3-37 for more information.

Syntax

```
set snmp persistmode {auto | manual}
```

Parameters

auto	Sets the configuration persistence mode to automatic. This is the default state.
manual	Sets the configuration persistence mode to manual. In order to make configuration changes persistent, the **save config** command must be issued as described in "save config" on page 3-39. This mode is useful for reverting back to old configurations.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the configuration persistence mode to manual:

```
B2(su)->set snmp persistmode manual
```

save config

Use this command to save the running configuration. If applicable, this command will save the configuration to all switch members in a stack.

Syntax

```
save config
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to save the running configuration:

```
B2(su)->save config
```

dir

Use this command to list configuration and image files stored in the file system.

Syntax

dir [*filename*]

Parameters

filename	(Optional) Specifies the file name or directory to list.

Defaults

If **filename** is not specified, all files in the system will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to list all the configuration and image files in the system. The display indicates which image file is the Active file and which image file is the Boot file that will be used the next time the system reboots.

```
B2(su)->dir
Images:
=====================================================================
Filename:      b2-series_04.02.00.0029 (Active)
Version:       04.02.00.0029
Size:          9411584 (bytes)
Date:          Fri Aug  1 06:55:23 2008
CheckSum:      6126a7aadfdf05150afb6eca51982302
Compatibility: <platform specific>

Filename:      b2-series_04.02.00.0030 (Boot)
Version:       04.02.00.0030
Size:          9411584 (bytes)
Date:          Fri Aug  8 08:44:04 2008
CheckSum:      627938b785fa7fdb8eed74672af1edcc
Compatibility: <platform specific>

Files:                          Size
=============================== ========
configs:
```

```
base_may                        22629
base_apr                        22629
base_july                       20581
base_june                       20581
logs:
current.log                     2065
```

show file

Use this command to display the contents of a file.

Syntax

show file *filename*

Parameters

filename	Specifies the name of the file to display.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display a text file named “mypolicy” in the configs/ directory. Note that only a portion of the file is shown in this example.

```
B2(rw)->show file configs/mypolicy
1 :
2 :
3 : #policy
4 :
5 : set policy profile 1 name "Check GUEST" pvid-status enable pvid 4095 untagged-
vlans 1
6 :
7 : set policy profile 2 name "User LABORATORIES" pvid-status enable pvid 680 cos-
status enable cos 4 untagged-vlans 680
8 :
9 : set policy profile 3 name "Administrator" pvid-status enable pvid 4095
10 :
11 : set policy profile 4 name "Guest" pvid-status enable pvid 999 cos-status
enable cos 3 untagged-vlans 999
12 :
13 : set policy port ge.1.1 4
14 :
15 : set policy port ge.1.2 4
```

show config

Use this command to display the system configuration or write the configuration to a file.

Syntax

show config [**all** | *facility*] [**outfile** {**configs/***filename*}]

Parameters

all	(Optional) Displays default and non-default configuration settings.
facility	(Optional) Specifies the exact name of one facility for which to show configuration. For example, enter "router" to show only router configuration.
outfile	(Optional) Specifies that the current configuration will be written to a text file in the configs/ directory.
configs/*filename*	Specifies a filename in the configs/ directory to display.

Defaults

By default, **show config** will display all non-default configuration information for all facilities.

Mode

Switch command, read-only.

Usage

The separate facilities that can be displayed by this command are identified in the display of the current configuration by a # preceding the facility name. For example, "#port" indicates the facility name "port."

Examples

This example shows how to write the current configuration to a file named save_config2:

```
B2(rw)->show config all outfile configs/save_config2
```

This example shows how to display configuration for the facility "port".

```
B2(rw)->show config port
This command shows non-default configurations only.
Use 'show config all' to show both default and non-default configurations.

begin
!
#***** NON-DEFAULT CONFIGURATION *****
!
!

#port
set port jumbo disable ge.1.1

!
end
```

configure

Use this command to execute a previously downloaded configuration file stored on the switch.

Syntax

configure *filename* [**append**]

Parameters

filename	Specifies the path and file name of the configuration file to execute.
append	(Optional) Appends the configuration file contents to the current configuration. This is equivalent to typing the contents of the config file directly into the CLI and can be used, for example, to make incremental adjustments to the current configuration.

Defaults

If **append** is not specified, the current running configuration will be replaced with the contents of the configuration file, which will require an automated reset of the chassis.

Mode

Switch command, read-write.

Example

This example shows how to execute the "Jan1_2004.cfg" configuration file:

```
B2(su)->configure configs/Jan1_2004.cfg
```

copy

Use this command to upload or download an image or a CLI configuration file.

Syntax

copy *source destination*

Parameters

source	Specifies location and name of the source file to copy. Options are a local file path in the configs directory, or the URL of a TFTP server.
destination	Specifies location and name of the destination where the file will be copied. Options are a slot location and file name, or the URL of a TFTP server.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example shows how to download an image via TFTP:

```
B2(su)->copy tftp://10.1.192.34/version01000 system:image
```

This example shows how to download a configuration file to the configs directory:

```
B2(su)->copy tftp://10.1.192.1/Jan1_2004.cfg configs/Jan1_2004.cfg
```

delete

Use this command to remove an image or a CLI configuration file from the switch.

Syntax

delete *filename*

Parameters

filename	Specifies the local path name to the file. Valid directories are /images and /configs.44.

Defaults

None.

Mode

Switch command, read-write.

Usage

Use the dir command (page 3-40) to display current image and configuration file names.

Example

This example shows how to delete the "Jan1_2004.cfg" configuration file:

```
B2(su)->delete configs/Jan1_2004.cfg
```

show tftp settings

Use this command to display TFTP settings used by the switch during data transfers using TFTP.

Syntax

show tftp settings

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Usage

The TFTP timeout value can be set with the **set tftp timeout** command. The TFTP retry value can be set with the **set tftp retry** command.

Example

This example shows the output of this command.

```
B2(ro)->show tftp settings
TFTP packet timeout (seconds): 2
TFTP max retry: 5
```

set tftp timeout

Use this command to configure how long TFTP will wait for a reply of either an acknowledgement packet or a data packet during a data transfer.

Syntax

set tftp timeout *seconds*

Parameters

seconds	Specifies the number of seconds to wait for a reply. The valid range is from 1 to 30 seconds. Default value is 2 seconds.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the timeout period to 4 seconds.

```
B2(rw)->set tftp timeout 4
```

clear tftp timeout

Use this command to reset the TFTP timeout value to the default value of 2 seconds.

Syntax

clear tftp timeout

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the timeout value to the default of 2 seconds.

```
B2(rw)-> clear tftp timeout
```

set tftp retry

Use this command to configure how many times TFTP will resend a packet, either an acknowledgement packet or a data packet.

Syntax

set tftp retry *retry*

Parameters

retry	Specifies the number of times a packet will be resent. The valid range is from 1 to 1000. Default value is 5 retries.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the retry count to 3.

```
B2(rw)->set tftp retry 3
```

clear tftp retry

Use this command to reset the TFTP retry value to the default value of 5 retries.

Syntax

clear tftp retry

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the retry value to the default of 5 retries.

```
B2(rw)-> clear tftp retry
```

Clearing and Closing the CLI

Purpose

To clear the CLI screen or to close your CLI session.

Commands

For information about...	Refer to page...
cls	3-47
exit	3-47

cls (clear screen)

Use this command to clear the screen for the current CLI session.

Syntax

cls

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to clear the CLI screen:

```
B2(su)->cls
```

exit

Use either of these commands to leave a CLI session.

Syntax

exit

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Usage

By default, switch timeout occurs after 15 minutes of user inactivity, automatically closing your CLI session. Use the set logout command (page 3-29) to change this default.

Example

This example shows how to exit a CLI session:

```
B2(su)->exit
```

Resetting the Switch

Purpose

To reset one or more switches, and to clear the user-defined configuration parameters.

Commands

For information about...	Refer to page...
reset	3-48
clear config	3-49

reset

Use this command to reset the switch without losing any user-defined configuration settings.

Syntax

reset [*unit*]

Parameters

unit	(Optional) Specifies a unit to be reset.

Defaults

If no *unit* ID is specified, the entire system will be reset.

Mode

Switch command, read-write.

Usage

A SecureStack B2 switch can also be reset with the RESET button located on its front panel. For information on how to do this, refer to the SecureStack B2 Installation Guide shipped with your switch.

Examples

This example shows how to reset the system:

```
B2(su)->reset
Are you sure you want to reload the stack? (y/n) y

Saving Configuration to stacking members
Reloading all switches.
```

This example shows how to reset unit 1:

```
B2(su)->reset 1
Are you sure you want to reload the switch? (y/n) y

Reloading switch 1.
This switch is manager of the stack.
STACK: detach 3 units
```

clear config

Use this command to clear the user-defined configuration parameters.

Syntax

clear config [**all**]

Parameters

all	(Optional) Clears user-defined configuration parameters (and stack unit numbers and priorities, if applicable).

Defaults

If **all** is not specified, stacking configuration parameters will not be cleared.

Mode

Switch command, read-write.

Usage

When using the **clear config** command to clear configuration parameters in a stack, it is important to remember the following:

- Use **clear config** to clear configuration parameters without clearing stack unit IDs. This command WILL NOT clear stack parameters and avoids the process of re-numbering the stack.
- Use **clear config all** when it is necessary to clear all configuration parameters, including stack unit IDs (if applicable) and switch priority values.
- Use the **clear ip address** command to clear the IP address.

Configuration parameters and stacking information can also be cleared on the master unit only by selecting option 10 (restore configuration to factory defaults) from the boot menu on switch startup. This selection will leave stacking priorities on all other units, if applicable.

Example

This example shows how to clear configuration parameters (including stacking parameters, if applicable):

```
B2(su)->clear config all
```

Using and Configuring WebView

Purpose

By default, WebView (The Enterasys Networks embedded web server for switch configuration and management tasks) is enabled on TCP port number 80 on the SecureStack B2 switch. You can verify WebView status, and enable or disable WebView using the commands described in this section. WebView can also be securely used over SSL port 443, if SSL is enabled on the switch. By default, SSL is disabled.

To use WebView, type the IP address of the switch in your browser. To use WebView over SSL, type in https:// then the IP address of the switch. For example, https://172.16.2.10.

Commands

For information about...	Refer to page...
show webview	3-50
set webview	3-51
show ssl	3-51
set ssl	3-52

show webview

Use this command to display WebView status.

Syntax

show webview

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display WebView status:

```
B2(rw)->show webview
WebView is Enabled.
```

set webview

Use this command to enable or disable WebView on the switch.

Syntax

set webview {**enable** | **disable**}

Parameters

enable | **disable**	Enable or disable WebView on the switch.

Defaults

None.

Mode

Switch command, read-write.

Usage

It is good practice for security reasons to disable HTTP access on the switch when finished configuring with WebView, and then to only enable WebView on the switch when changes need to be made.

Example

This example shows how to disable WebView on the switch:

```
B2(rw)->set webview disable
```

show ssl

Use this command to display SSL status.

Syntax

show ssl

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display SSL status:

```
B2(rw)->show ssl
SSL status: Enabled
```

set ssl

Use this command to enable or disable the use of WebView over SSL port 443. By default, SSL is disabled on the switch. This command can also be used to reinitialize the hostkey that is used for encryption.

Syntax

set ssl {**enabled** | **disabled** | **reinitialize** | **hostkey reinitialize**}

Parameters

enabled | **disabled**	Enable or disable the ability to use WebView over SSL.
reinitialize	Stops and then restarts the SSL process.
hostkey reinitialize	Stops SSL, regenerates new keys, and then restarts SSL.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable SSL:

```
B2(rw)->set ssl enabled
```

Gathering Technical Support Information

Purpose

To gather common technical support information.

Command

For information about...	Refer to page...
show support	3-53

show support

Use this command to display switch information for troubleshooting.

Syntax

```
show support
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Usage

This command initiates a number of **show** commands to easily gather basic information from an installed device. To use this command, set your console to capture the output to a file first, before executing the command, since the output is extensive.

Output from the following commands is gathered by this command:

- show version
- show logging buffer
- show port status
- show system utilization process
- show system utilization storage
- show config

Example

There is no display example because the output of this command is quite lengthy.

4

Activating Licensed Features

In order to enable the B2 advanced features, such as Policy, you must purchase and activate a license key. If you have purchased a license, you can proceed to activate your license as described in this section. If you wish to obtain a permanent or evaluation license, use the Enterasys Customer Portal or contact the Enterasys Networks Sales Department.

Note: All members of a stack must be licensed in order to support licensed features in a stack environment. If the master unit in a stack has an activated license, all member units also must have an activated license in order to operate. If the master unit in a stack does not have an activated license, then the licensed functionality will not be available to member units, even if they have licenses installed.

License Key Field Descriptions

When Enterasys supplies a license, it will be sent to you as a character string similar to the following:

```
INCREMENT B2Policy 2006.0127 27-jan-2011 0123456789AB 0123456789AB
```

The contents of the six fields, from the left, indicate:

- Type—the type of license. For the SecureStack B2, the value in this field is always "INCREMENT."
- Feature—description of the feature being licensed. For example, "B2`Policy`" as shown in the character string above.
- Date-based version (DBV)—a date-related string. For the SecureStack B2, the value in this field is not significant.
- Expiration type—indicates whether the license is a permanent or an evaluation license. If the license is an evaluation license, this field will contain the expiration date of the license. If the license is a permanent license, this field will contain the word "permanent."
- Key—the license key.
- Host ID—the serial number of the switch to which this license applies.

When activating licenses on SecureStack devices, we recommend that you copy and paste the license character string, rather than entering the text manually.

Licensing Procedure in a Stack Environment

The licenses for all members of an operating stack can be activated during a single CLI session, by following these steps:

1. Obtain valid licenses for all members of the stack from the Enterasys Customer Portal.

2. Optionally, note the serial numbers of the switches in the stack. You can use the **show system hardware** command (page 3-14) to display the switch serial numbers.

Note: Since license keys are applied to the correct stack member switch automatically, based on the switch serial number that is part of the license string, you should know the serial numbers of the switches in order to enable the licenses of the member switches first, before the master unit.

3. Enable the licenses on the stack members first, before enabling the master unit, using the **set license** command (page 4-3). For example:

```
B2(rw)->set license INCREMENT B2Policy 2006.0127 27-jan-2011 0123456789AB
0123456789AB
```

4. Enable the license on the switch master unit last, using the **set license** command.

Adding a New Member to a Licensed Stack

When a SecureStack B2 switch without a license is added to a stack that has licensing enabled, the ports on the new switch will not pass traffic until a license has been applied to the new switch. To add a new member to a licensed stack:

1. Obtain a license for the new switch from the Enterasys Customer Portal.
2. Add the new unit to the stack, following the procedure in "Adding a New Unit to an Existing Stack" on page 2-3.
3. Use the **set license** command to install and activate the new switch's license. The new switch will then join the stack and its ports will be attached.

Alternatively, you can install and activate the new switch's license first, before adding the switch to the stack.

Clearing, Showing, and Applying Licenses

Licenses can be displayed, applied, and cleared only with the license commands described in this chapter. General configuration commands such as **show config** or **clear config** do not apply to licenses.

Every license is associated with a specific hardware platform, based on the serial number of the hardware platform. If you need to move a license from one hardware platform to another, you must contact Enterasys Customer Support to arrange for re-hosting of the license.

Commands

For information about...	Refer to page...
set license	4-3
show license	4-4
clear license	4-4

set license

Use this command to activate the SecureStack B2 licensed features.

Syntax

set license *type feature DBV expiration key hostid*

Parameters

type	Specifies the type of license. For the SecureStack B2, the value in this field is always INCREMENT.
feature	The name of the feature being licensed.
DBV	A date-related string generated as part of the license.
expiration	Indicates whether the license is a permanent or an evaluation license. If the license is an evaluation license, this field will contain the expiration date of the license. If the license is a permanent license, this field will contain the word "permanent."
key	The license key.
hostid	The serial number of the switch to which this license applies.

Defaults

None.

Mode

Switch command, read-write.

Usage

If multiple switches are used in a stack, an individual license is required for each stack member. Refer to "Licensing Procedure in a Stack Environment" on page 4-1 for more information.

When activating licenses with this command, Enterasys Networks recommends that you copy and paste the entire license character string, rather than enter the text manually. If you enter the character string manually, ensure that you exactly match the capitalization of the character string sent to you.

Every license is associated with a specific hardware platform, based on the serial number of the hardware platform. If you need to move a license from one hardware platform to another, you must contact Enterasys Customer Support to arrange for re-hosting of the license.

Example

This example shows how to activate a permanent license key on the switch with serial number `075103099041`. In this example, the switch is a stand-alone unit so its unit number is 1.

```
B2(rw)->set license INCREMENT B2Policy 2008.0212 permanent DF6A8558E5AB
075103099041
Validating license on unit 1
License successfully validated and set on unit 1
B2(rw)->
```

show license

Use this command to display license key information for switches with activated licenses.

Syntax

show license [**unit** *number*]

Parameters

unit number	(Optional) Specifies the switch for which to display license information. Refer to Chapter 2, **Configuring Switches in a Stack**, for more information about stack unit IDs, or numbers.

Defaults

If no unit number is specified, license key information for all switches in the stack is displayed.

Mode

Switch command, read-only.

Usage

Licenses can be displayed, applied, and cleared only with the license commands described in this chapter. General configuration commands such as **show config** or **clear config** do not affect licenses.

Example

This example shows how to display license key information for switch unit 1 in the stack.

```
B2(ro)->show license unit 1
unit 1
key: INCREMENT B2Policy 2006.0728 permanent 31173CAC6495 045100039001
status: Active
```

clear license

Use this command to clear the license key settings..

Syntax

clear license featureId

Parameters

featureID *feature*	The name of the feature being cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the `Policy` licensed feature :

```
B2(rw)->clear license featureId b2Policy
```

5

Configuring System Power and PoE

Important Notice

The commands in this section apply only to PoE-equipped devices. Consult the Installation Guide for your product to determine if it is PoE-equipped.

The commands in this chapter allow you to review and set system power and PoE (Power over Ethernet) parameters, including the power available to the system, the usage threshold for each module, whether or not SNMP trap messages will be sent when power status changes, and per-port PoE settings.

Commands

For information about...	Refer to page...
show inlinepower	5-1
set inlinepower threshold	5-2
set inlinepower trap	5-3
set inlinepower detectionmode	5-3
show port inlinepower	5-4
set port inlinepower	5-5

show inlinepower

Use this command to display system power properties.

Syntax

```
show inlinepower
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display system power properties:

```
B2(su)->show inlinepower
Detection Mode         : auto

Unit  Status   Power(W)   Consumption(W)   Usage(%)   Threshold(%)   Trap
----  ------   --------   --------------   --------   ------------   ----
1     auto     480         0.00            0.00       80             enable
```

Table 5-1 provides an explanation of the command output.

Table 5-1 show inlinepower Output Details

Output	What It Displays...
Detection Mode	Displays the PD detection mode used by the switch. The detection mode can be configured with the command "set inlinepower detectionmode" (page 5-3).
Unit	Number of PoE-capable module.
Status	Whether the PoE administrative state is off (disabled) or auto (on). This state is not configurable.
Power (W)	Unit's available power wattage.
Consumption (W)	Unit's power wattage consumed.
Usage (%)	Unit's percentage of total system PoE power usage.
Threshold (%)	Unit's alloted percentage of total PoE power available in the system. The threshold can be configured with the command "set inlinepower threshold" (page 5-2).
Trap	Whether PoE trap messaging is enabled or disabled on this unit. Trap messaging can be configured with the command "set inlinepower trap" (page 5-3).

set inlinepower threshold

Use this command to set the power usage threshold on a specified unit or module.

Syntax

`set inlinepower threshold` *`usage-threshold module-number`*

Parameters

usage-threshold	Specifies a power threshold as a percentage of available system power. Valid values are **11** to **100**.
module-number	Specifies the module or unit on which to set the power threshold.

Defaults

None.

Mode

Switch command, read-write.

Usage

The threshold is expressed as a percentage of the available PoE power. When this threshold is reached, a trap will be sent if traps are enabled with the set inlinepower trap command.

Example

This example shows how to set the power threshold to 90 on module/unit 1:

```
B2(su)->set inlinepower threshold 90 1
```

set inlinepower trap

Use this command to enable or disable the sending of an SNMP trap message for a unit or module whenever the status of its ports changes, or whenever the unit's power usage threshold is crossed.

Syntax

set inlinepower trap {**disable** | **enable**} *module-number*

Parameters

disable | **enable**	Disables or enables inline power trap messaging.
module-number	Specifies the module or unit on which to disable or enable trap messaging.

Defaults

Sending of traps is disabled by default.

Mode

Switch command, read-write.

Usage

The module's or unit's power usage threshold must be set using the **set inlinepower threshold** command as described on page 5-2.

Example

This example shows how to enable inline power trap messaging on module 1:

```
B2(su)->set inlinepower trap enable 1
```

set inlinepower detectionmode

Use this command to specify the method the switch will use to detect PDs (powered devices) connected to its ports.

Syntax

set inlinepower detectionmode {**auto** | **ieee**)

Parameters

auto	Specifies that the switch will use the standard 802.3af detection method first. If that fails, then the swtich will use the legacy (pre 802.3af standard) capacitance method of detection.
ieee	Specifies that the switch will only the standard 802.3af detection method.

Defaults

Default detection mode is **auto**.

Mode

Switch command, read-write.

Usage

This command is used to specify how the switch should detect PDs connected to its ports. The PoE hardware in the switches can use the IEEE standard 802.3af (resistor-based) method or a proprietary method using capacitor detection.

If **auto** is configured, the switch will first use the IEEE resistor-based detection method, and if that fails, the switch will use the capacitor-based detection method. If **ieee** is configured, only the IEEE resistor-based detection method will be used.

Example

This example sets the switch's PD detection mode to IEEE standard 802.3af only.

```
B2(su)->set inlinepower detectionmode ieee
```

show port inlinepower

Use this command to display all ports supporting PoE.

Syntax

show port inlinepower [*port-string*]

Parameters

port-string	(Optional) Displays information for specific PoE port(s).

Defaults

If not specified, information for all PoE ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display PoE information for port `fe.2.1`. In this case, the port's administrative state, PoE priority and class have not been changed from default values:

```
B2(su)->show port inlinepower fe.2.1
Port     Type      Admin   Oper        Priority      Class       Power(W)
----     ----      -----   ----        --------      -----       --------
fe.2.1   wireless  auto    searching   low           0           15.4
```

set port inlinepower

Use this command to configure PoE parameters on one or more ports.

Syntax

set port inlinepower *port-string* {[**admin** {**off** | **auto**}] [**priority** {**critical** | **high** | **low**}] [**type** *type*]}

Parameters

port-string	Specifies the port(s) on which to configure PoE.
admin off | **auto**	Sets the PoE administrative state to off (disabled) or auto (on).
priority critical | **high** | **low**	Sets the port(s) priority for the PoE allocation algorithm to critical (highest), high or low.
type *type*	Specifies a string describing the type of device connected to a port.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable PoE on port `fe.3.1` with critical priority:

```
B2(su)->set port inlinepower fe.3.1 admin auto priority critical
```

6

Discovery Protocol Configuration

This chapter describes how to configure discovery protocols.

For information about...	Refer to page...
Configuring CDP	6-1
Configuring Cisco Discovery Protocol	6-7
Configuring Link Layer Discovery Protocol and LLDP-MED	6-13

Configuring CDP

Purpose

To review and configure the Enterasys CDP discovery protocol. This protocol is used to discover network topology. When enabled, this protocol allows Enterasys devices to send periodic PDUs about themselves to neighboring devices.

Commands

The commands used to review and configure the CDP discovery protocol are listed below.

For information about...	Refer to page...
show cdp	6-2
set cdp state	6-3
set cdp auth	6-4
set cdp interval	6-4
set cdp hold-time	6-5
clear cdp	6-5
show neighbors	6-6

show cdp

Use this command to display the status of the CDP discovery protocol and message interval on one or more ports.

Syntax

show cdp [*port-string*]

Parameters

port-string	(Optional) Displays CDP status for a specific port. For a detailed description of possible port-string values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, all CDP information will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display CDP information for ports fe.1.1 through fe.1.9:

```
B2(su)->show cdp fe.1.1-9
CDP Global Status         :auto-enable
CDP Version Supported     :30 hex
CDP Hold Time             :180
CDP Authentication Code   :00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 hex
CDP Transmit Frequency    :60

Port       Status
-----------------
fe.1.1     auto-enable
fe.1.2     auto-enable
fe.1.3     auto-enable
fe.1.4     auto-enable
fe.1.5     auto-enable
fe.1.6     auto-enable
fe.1.7     auto-enable
fe.1.8     auto-enable
fe.1.9     auto-enable
```

Table 6-2 provides an explanation of the command output.

Table 6-2 show cdp Output Details

Output Field	What It Displays...
CDP Global Status	Whether CDP is globally auto-enabled, enabled or disabled. The default state of auto-enabled can be reset with the set cdp state command. For details, refer to "set cdp state" on page 6-3.
CDP Versions Supported	CDP version number(s) supported by the switch.
CDP Hold Time	Minimum time interval (in seconds) at which CDP configuration messages can be set. The default of 180 seconds can be reset with the set cdp hold-time command. For details, refer to "set cdp hold-time" on page 6-5.

Table 6-2 show cdp Output Details (Continued)

Output Field	What It Displays...
CDP Authentication Code	Authentication code for CDP discovery protocol. The default of 00-00-00-00-00-00-00-00 can be reset using the set cdp auth command. For details, refer to "set cdp auth" on page 6-4.
CDP Transmit Frequency	Frequency (in seconds) at which CDP messages can be transmitted. The default of 60 seconds can be reset with the set cdp interval command. For details, refer to "set cdp interval" on page 6-4.
Port	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
Status	Whether CDP is enabled, disabled or auto-enabled on the port.

set cdp state

Use this command to enable or disable the CDP discovery protocol on one or more ports.

Syntax

```
set cdp state {auto | disable | enable} [port-string]
```

Parameters

auto | **disable** | **enable**	Auto-enables, disables or enables the CDP protocol on the specified port(s). In auto-enable mode, which is the default mode for all ports, a port automatically becomes CDP-enabled upon receiving its first CDP message.
port-string	(Optional) Enables or disables CDP on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, the CDP state will be globally set.

Mode

Switch command, read-write.

Examples

This example shows how to globally enable CDP:

```
B2(su)->set cdp state enable
```

This example shows how to enable the CDP for port fe.1.2:

```
B2(su)->set cdp state enable fe.1.2
```

This example shows how to disable the CDP for port fe.1.2:

```
B2(su)->set cdp state disable fe.1.2
```

set cdp auth

Use this command to set a global CDP authentication code.

Syntax

set cdp auth *auth-code*

Parameters

auth-code	Specifies an authentication code for the CDP protocol. This can be up to 16 hexadecimal values separated by commas.

Defaults

None.

Mode

Switch command, read-write.

Usage

The authentication code value determines a switch's CDP domain. If two or more switches have the same CDP authentication code, they will be entered into each other's CDP neighbor tables. If they have different authentication codes, they are in different domains and will not be entered into each other's CDP neighbor tables.

A switch with the default authentication code (16 null characters) will recognize all switches, no matter what their authentication code, and enter them into its CDP neighbor table.

Example

This example shows how to set the CDP authentication code to 1,2,3,4,5,6,7,8:

```
B2(su)->set cdp auth 1,2,3,4,5,6,7,8:
```

set cdp interval

Use this command to set the message interval frequency (in seconds) of the CDP discovery protocol.

Syntax

set cdp interval *frequency*

Parameters

frequency	Specifies the transmit frequency of CDP messages in seconds.Valid values are from 5 to 900 seconds.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the CDP interval frequency to 15 seconds:

```
B2(su)->set cdp interval 15
```

set cdp hold-time

Use this command to set the hold time value for CDP discovery protocol configuration messages.

Syntax

set cdp hold-time *hold-time*

Parameters

hold-time	Specifies the hold time value for CDP messages in seconds.Valid values are from 15 to 600.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set CDP hold time to 60 seconds:

```
B2(su)->set cdp hold-time 60
```

clear cdp

Use this command to reset CDP discovery protocol settings to defaults.

Syntax

clear cdp {[**state**] [**port-state** *port-string*] [**interval**] [**hold-time**] [**auth-code**]}

Parameters

state	(Optional) Resets the global CDP state to auto-enabled.
port-state *port-string*	(Optional) Resets the port state on specific port(s) to auto-enabled.
interval	(Optional) Resets the message frequency interval to 60 seconds.
hold-time	(Optional) Resets the hold time value to 180 seconds.
auth-code	(Optional) Resets the authentication code to 16 bytes of 00 (00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00).

Defaults

At least one optional parameter must be entered.

Mode

Switch command, read-write.

Example

This example shows how to reset the CDP state to auto-enabled:

```
B2(su)->clear cdp state
```

show neighbors

This command displays Neighbor Discovery information for either the CDP or Cisco DP protocols.

Syntax

show neighbors [*port-string*]

Parameters

port-string	(Optional) Specifies the port or ports for which to display Neighbor Discovery information.

Defaults

If no port is specified, all Neighbor Discovery information is displayed.

Mode

Switch command, read-only.

Usage

This command displays information discovered by both the CDP and the Cisco DP protocols.

Example

This example displays Neighbor Discovery information for all ports.

```
B2(su)->show neighbors

 Port       Device ID            Port ID           Type       Network Address
--------------------------------------------------------------------------------
fe.1.1      00036b8b1587         12.227.1.176      ciscodp    12.227.1.176
fe.1.6      0001f496126f         140.2.3.1         ciscodp    140.2.3.1
fe.1.6      00-01-f4-00-72-fe    140.2.4.102       cdp        140.2.4.102
fe.1.6      00-01-f4-00-70-8a    140.2.4.104       cdp        140.2.4.104
fe.1.6      00-01-f4-c5-f7-20    140.2.4.101       cdp        140.2.4.101
fe.1.6      00-01-f4-89-4f-ae    140.2.4.105       cdp        140.2.4.105
fe.1.6      00-01-f4-5f-1f-c0    140.2.1.11        cdp        140.2.1.11
fe.1.19     0001f400732e         165.32.100.10     ciscodp    165.32.100.10
```

Configuring Cisco Discovery Protocol

Purpose

To review and configure the Cisco discovery protocol. Discovery protocols are used to discover network topology. When enabled, they allow Cisco devices to send periodic PDUs about themselves to neighboring devices. Specifically, this feature enables recognizing PDUs from Cisco phones. A table of information about detected phones is kept by the switch and can be queried by the network administrator.

Commands

The commands used to review and configure the Cisco discovery protocol are listed below. Refer also to "show neighbors" on page 6-6.

For information about...	Refer to page...
show ciscodp	6-7
show ciscodp port info	6-8
set ciscodp status	6-9
set ciscodp timer	6-9
set ciscodp holdtime	6-10
set ciscodp port	6-10
clear ciscodp	6-12

show ciscodp

Use this command to display global Cisco discovery protocol information.

Syntax

`show ciscodp`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display global Cisco DP information.

```
B2(su)->show ciscodp
CiscoDP :Enabled
Timer :5
Holdtime (TTl): 180
```

```
Device ID : 001188554A60
Last Change : WED NOV 08 13:19:56 2006
```

Table 6-3 provides an explanation of the command output.

Table 6-3 show ciscodp Output Details

Output Field	What It Displays...
CiscoDP	Whether Cisco DP is globally enabled or disabled. Auto indicates that Cisco DP will be globally enabled only if Cisco DP PDUs are received. Default setting of auto-enabled can be reset with the **set ciscodp status** command.
Timer	The number of seconds between Cisco discovery protocol PDU transmissions. The default of 60 seconds can be reset with the **set ciscodp timer** command.
Holdtime	Number of seconds neighboring devices will hold PDU transmissions from the sending device. Default value of 180 can be changed with the **set ciscodp holdtime** command.
Device ID	The MAC address of the switch.
Last Change	The time that the last Cisco DP neighbor was discovered.

show ciscodp port info

Use this command to display summary information about the Cisco discovery protocol on one or more ports.

Syntax

show ciscodp port info [*port-string*]

Parameters

port-string	(Optional) Displays Cisco DP information for a specific port. For a detailed description of possible port-string values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, Cisco DP information for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display Cisco DP information for Gigabit Ethernet port 1 in slot 1.

```
B2(su)->show ciscodp port info fe.1.1

 port       state      vvid      trusted   cos
-------------------------------------------------
fe.1.1     enable     none         yes      0
```

Table 6-4 provides an explanation of the command output.

Table 6-4 show ciscodp port info Output Details

Output Field	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
State	Whether Cisco DP is enabled, disabled or auto-enabled on the port. Default state of enabled can be changed using the **set ciscodp port** command.
vvid	Whether a voice VLAN ID has been set on this port. Default of none can be changed using the **set ciscodp port** command.
trusted	The trust mode of the port. Default of trusted can be changed using the **set ciscodp port** command.
cos	The Class of Service priority value for untrusted traffic. The default of 0 can be changed using the **set ciscodp port** command.

set ciscodp status

Use this command to enable or disable the Cisco discovery protocol globally on the switch.

Syntax

set ciscodp state {**auto** | **disable** | **enable**}

Parameters

auto	Globally enable only if Cisco DP PDUs are received.
disable	Globally disable Cisco discovery protocol.
enable	Globally enable Cisco discovery protocol.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to globally enable CiscoDP:

```
B2(su)->set ciscodp state enable
```

set ciscodp timer

Use this command to set the number of seconds between Cisco discovery protocol PDU transmissions.

Syntax

set ciscodp timer *seconds*

Parameters

seconds	Specifies the number of seconds between Cisco DP PDU transmissions. Valid values are from 5 to 254 seconds.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the Cisco DP timer to 120 seconds.

```
B2(su)->set ciscodp timer 120
```

set ciscodp holdtime

Use this command to set the time to live (TTL) for Cisco discovery protocol PDUs. This is the amount of time, in seconds, neighboring devices will hold PDU transmissions from the sending device.

Syntax

set ciscodp holdtime *hold-time*

Parameters

hold-time	Specifies the time to live for Cisco DP PDUs. Valid values are from 10 to 255 seconds.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set Cisco DP hold time to 180 seconds:

```
B2(su)->set ciscodp hold-time 180
```

set ciscodp port

Use this command to set the status, voice VLAN, extended trust mode, and CoS priority for untrusted traffic for the Cisco Discovery Protocol on one or more ports.

Syntax

set ciscodp port {[**status** {**disable** | **enable**}] [**vvid** {*vlan-id* | **none** | **dot1p** | **untagged**}] [**trusted** {**yes** | **no**}] [**cos** *value*]} *port-string*

Parameters

status	Sets the CiscoDP port operational status.
disable	Does not transmit or process CiscoDP PDUs.
enable	Transmits and processes CiscoDP PDUs.
vvid	Sets the port voice VLAN for CiscoDP PDU transmission.
vlan-id	Specifies the VLAN ID, range 1-4094.
none	No voice VLAN will be used in CiscoDP PDUs. This is the default.
dot1p	Instructs attached phone to send 802.1p tagged frames.
untagged	Instructs attached phone to send untagged frames.
trusted	Sets the extended trust mode on the port.
yes	Instructs attached phone to allow the device connected to it to transmit traffic containing any CoS or Layer 2 802.1p marking. This is the default value.
no	Instructs attached phone to overwrite the 802.1p tag of traffic transmitted by the device connected to it to 0, by default, or to the value configured with the **cos** parameter.
cos *value*	Instructs attached phone to overwrite the 802.1p tag of traffic transmitted by the device connected to it with the specified *value*, when the trust mode of the port is set to untrusted. *Value* can range from 0 to 7, with 0 indicating the lowest priority.
port-string	Specifies the port(s) on which status will be set.

Defaults

- Status: enabled
- Voice VLAN: none
- Trust mode: trusted
- CoS value: 0

Mode

Switch mode, read-write.

Usage

The following points describe how the Cisco DP extended trust settings work on the switch.

- A Cisco DP port trust status of trusted or untrusted is only meaningful when a Cisco IP phone is connected to a switch port and a PC or other device is connected to the back of the Cisco IP phone.
- A Cisco DP port state of trusted or untrusted only affects tagged traffic transmitted by the device connected to the Cisco IP phone. Untagged traffic transmitted by the device connected to the Cisco IP phone is unaffected by this setting.
- If the switch port is configured to a Cisco DP trust state of **trusted** (with the **trusted yes** parameter of this command), this setting is communicated to the Cisco IP phone instructing it to allow the device connected to it to transmit traffic containing any CoS or Layer 2 802.1p marking.

- If the switch port is configured to a Cisco DP trust state of **untrusted** (**trusted no**), this setting is communicated to the Cisco IP phone instructing it to overwrite the 802.1p tag of traffic transmitted by the device connected to it to 0, by default, or to the value specified by the **cos** parameter of this command.
- There is a one-to-one correlation between the value set with the **cos** parameter and the 802.1p value assigned to ingressed traffic by the Cisco IP phone. A value of 0 equates to an 802.1p priority of 0. Therefore, a value of 7 is given the highest priority.

Note: The Cisco Discovery Protocol must be globally enabled using the **set ciscodp status** command before operational status can be set on individual ports.

Examples

This example shows how to set the Cisco DP port voice VLAN ID to 3 on port fe.1.6 and enable the port operational state.

```
B2(rw)->set ciscodp port status enable vvid 3 fe.1.6
```

This example shows how to set the Cisco DP extended trust mode to untrusted on port fe.1.5 and set the CoS priority to 1.

```
B2(rw)->set ciscodp port trusted no cos 1 fe.1.5
```

clear ciscodp

Use this command to clear the Cisco discovery protocol back to the default values.

Syntax

clear ciscodp [**status** | **timer** | **holdtime** | {**port** {**status** | **vvid** | **trust** | **cos**} [*port-string*]}]

Parameters

status	Clears global CiscoDP enable status to default of auto.
timer	Clears the time between CiscoDP PDU transmissions to default of 60 seconds.
holdtime	Clears the time-to-live for CiscoDP PDU data to default of 180 seconds.
port	Clears the CiscoDP port configuration.
status	Clears the individual port operational status to the default of enabled.
vvid	Clears the individual port voice VLAN for CiscoDP PDU transmission to 0.
trust	Clears the trust mode configuration of the port to trusted.
cos	Clears the CoS priority for untrusted traffic of the port to 0.
port-string	(Optional) Specifies the port(s) on which status will be set.

Defaults

If no parameters are entered, all Cisco DP parameters are reset to the defaults globally and for all ports.

Mode

Switch mode, read-write.

Examples

This example shows how to clear all the Cisco DP parameters back to the default settings.

```
B2(rw)->clear ciscodp
```

This example shows how to clear the Cisco DP status on port fe.1.5.

```
B2(rw)->clear ciscodp port status fe.1.5
```

Configuring Link Layer Discovery Protocol and LLDP-MED

Overview

The Link Layer Discovery Protocol (LLPD) provides an industry standard, vendor-neutral way to allow network devices to advertise their identities and capabilities on a local area network, and to discover that information about their neighbors.

LLDP-MED is an enhancement to LLDP that provides the following benefits:

- Extended and automated power management of Power over Ethernet endpoints
- Inventory management, allowing network administrators to track their network devices and to determine their characteristics, such as manufacturer, software and hardware versions, and serial or asset numbers

The information sent by an LLDP-enabled device is extracted and tabulated by its peers. The communication can be done when information changes or on a periodic basis. The information tabulated is aged to ensure that it is kept up to date. Ports can be configured to send this information, receive this information, or both send and receive.

Either LLDP or LLDP-MED, but not both, can be used on an interface between two devices. A switch port uses LLDP-MED when it detects that an LLDP-MED-capable device is connected to it.

LLDP information is contained within a Link Layer Discovery Protocol Data Unit (LLDPDU) sent in a single 802.3 Ethernet frame. The information fields in LLDPDU are a sequence of short, variable-length, information elements known as TLVs — type, length, and value fields where:

- Type identifies what kind of information is being sent
- Length indicates the length of the information string in octets
- Value is the actual information that needs to be sent

The LLDP standard specifies that certain TLVs are mandatory in transmitted LLDPDUs, while others are optional. You can configure on a port-specific basis which optional LLDP and LLDP-MED TLVs should be sent in LLDPDUs.

Purpose

To review and configure LLPD and LLPD-MED.

Commands

The commands used to review and configure the CDP discovery protocol are listed below.

For information about...	Refer to page...
show lldp	6-14

For information about...	Refer to page...
show lldp port status	6-15
show lldp port trap	6-16
show lldp port tx-tlv	6-16
show lldp port location-info	6-17
show lldp port local-info	6-18
show lldp port remote-info	6-20
set lldp tx-interval	6-22
set lldp hold-multiplier	6-22
set lldp trap-interval	6-23
set lldp med-fast-repeat	6-23
set lldp port status	6-24
set lldp port trap	6-24
set lldp port med-trap	6-25
set lldp port tx-tlv	6-25
clear lldp	6-27
clear lldp port status	6-27
clear lldp port trap	6-28
clear lldp port med-trap	6-28
clear lldp port tx-tlv	6-29

Configuration Tasks

The commands included in this implementation allow you to perform the following configuration tasks:

Step	Task	Command(s)
1.	Configure global system LLDP parameters	**set lldp tx-interval** **set lldp hold-multiplier** **set lldp trap-interval** **set lldp med-fast-repeat** **clear lldp**
2.	Enable/disable specific ports to: • Transmit and process received LLDPDUs • Send LLDP traps • Send LLDP-MED traps	**set/clear lldp port status** **set/clear lldp port trap** **set/clear lldp port med-trap**

show lldp

Use this command to display LLDP configuration information.

Syntax

show lldp

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display LLDP configuration information.

```
B2(ro)->show lldp
Message Tx Interval        : 30
Message Tx Hold Multiplier : 4
Notification Tx Interval   : 5
MED Fast Start Count       : 3

Tx-Enabled Ports           : fe.1.1-60; fe.2.1-24; fe.3.1-30; fe.4.1-12;
Rx-Enabled Ports           : fe.1.1-60; fe.2.1-24; fe.3.1-30; fe.4.1-12;

Trap-Enabled Ports         : fe.1.1-60; fe.2.1-24; fe.3.1-30; fe.4.1-12;
MED Trap-Enabled Ports     : fe.1.1-60; fe.2.1-24; fe.3.1-30; fe.4.1-12;
```

show lldp port status

Use this command to display the LLDP status of one or more ports. The command lists the ports that are enabled to send and receive LLDP PDUs. Ports are enabled or disabled with the set lldp port status command.

Syntax

show lldp port status [*port-string*]

Parameters

port-string	(Optional) Displays LLDP status for one or a range of ports.

Defaults

If *port-string* is not specified, LLDP status information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display LLDP port status information for all ports.

```
B2(ro)->show lldp port status
```

```
Tx-Enabled Ports      : fe.1.1-60; fe.2.1-24; fe.3.1-30; fe.4.1-12

Rx-Enabled Ports      : fe.1.1-60; fe.2.1-24; fe.3.1-30; fe.4.1-12
```

show lldp port trap

Use this command to display the ports that are enabled to send an LLDP notification when a remote system change has been detected or an LLDP-MED notification when a change in the topology has been sensed. Ports are enabled to send LLDP notifications with the set lldp port trap command and to send LLDP-MED notifications with the set lldp port med-trap command.

Syntax

show lldp port trap [*port-string*]

Parameters

port-string	(Optional) Displays the port or range of ports that have been enabled to send LLDP and/or LLDP-MED notifications.

Defaults

If *port-string* is not specified, LLDP port trap information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display LLDP port trap information for all ports.

```
B2(ro)->show lldp port trap

Trap-Enabled Ports    :
MED Trap-Enabled Ports:
```

show lldp port tx-tlv

Use this command to display information about which optional TLVs have been configured to be transmitted on ports. Ports are configured to send optional TLVs with the set lldp port tx-tlv command.

Syntax

show lldp port tx-tlv [*port-string*]

Parameters

port-string	(Optional) Displays information about TLV configuration for one or a range of ports.

Defaults

If *port-string* is not specified, TLV configuration information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display transmit TLV information for three ports.

```
B2(ro)->show lldp port tx-tlv fe.1.1-3

* Means TLV is supported and enabled on this port
o Means TLV is supported on this port
  Means TLV is not supported on this port
Column Pro Id uses letter notation for enable: s-stp, l-lacp, g-gvrp

Ports    Port Sys  Sys  Sys Mgmt Vlan Pro  MAC PoE Link Max   MED MED MED MED
         Desc Name Desc Cap Addr Id   Id   PHY     Aggr Frame Cap Pol Loc PoE
-------  ---- ---- ---- --- ---- ---- ---- --- --- ---- ----  --- --- --- ---
fe.1.1   *    *    *    *   *    *    slg  *       *    *     *       *
fe.1.2   *    *    *    *   *    *    slg  *       *    *
fe.1.3   *    *    *    *   *    *    slg  *       *    *     *      *
```

show lldp port location-info

Use this command to display configured location information for one or more ports.

Syntax

show lldp port location-info [*port-string*]

Parameters

port-string	(Optional) Displays port location information for one or a range of ports.

Defaults

If *port-string* is not specified, port location configuration information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display port location information for three ports.

```
B2(ro)->show lldp port location-info fe.1.1-3

Ports      Type            Location
--------   -------------   -------------------------
fe.1.1     ELIN             1234567890
fe.1.2     ELIN             1234567890
fe.1.3     ELIN             1234567890
```

show lldp port local-info

Use this command to display the local system information stored for one or more ports. You can use this information to detect misconfigurations or incompatibilities between the local port and the attached endpoint device (remote port).

Syntax

show lldp port local-info [*port-string*]

Parameters

port-string	(Optional) Displays local system information for one or a range of ports.

Defaults

If *port-string* is not specified, local system information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display the local system information stored for port fe.4.1. Table 6-5 describes the output fields of this command.

```
B2(rw)->show lldp port local-info fe.4.1

Local Port  : fe.4.1      Local Port Id: fe.4.1
--------------------
Port Desc   : ... 1000BASE-TX RJ45 Gigabit Ethernet Frontpanel Port
Mgmt Addr   : 10.21.64.100
Chassis ID  : 00-E0-63-93-74-A5
Sys Name    : LLDP PoE test Chassis
Sys Desc    : Enterasys Networks, Inc.
Sys Cap Supported/Enabled     : bridge,router/bridge

Auto-Neg Supported/Enabled    : yes/yes
Auto-Neg Advertised           : 10BASE-T, 10BASE-TFD,
                                100BASE-TX, 100BASE-TXFD,
                                1000BASE-TFD,
                                Bpause
Operational Speed/Duplex/Type : 100 full tx
Max Frame Size (bytes)        : 1522

Vlan Id                       : 1
LAG Supported/Enabled/Id      : no/no/0
Protocol Id : Spanning Tree v-3 (IEEE802.1s)
              LACP v-1
              GVRP

PoE Device                    : PSE device
PoE Power Source              : primary
PoE MDI Supported/Enabled     : yes/yes
PoE Pair Controllable/Used    : false/spare
PoE Power Class               : 2
PoE Power Limit (mW)          : 15400
PoE Power Priority            : high
```

Table 6-5 describes the information displayed by the **show lldp port local-info** command.

Table 6-5 show lldp port local-info Output Details

Output Field	What it Displays...
Local Port	Identifies the port for which local system information is displayed.
Local Port Id	Mandatory basic LLDP TLV that identifies the port transmitting the LLDPDU. Value is ifName object defined in RFC 2863.
Port Desc	Optional basic LLDP TLV. Value is ifDescr object defined in RFC 2863.
Mgmt Addr	Optional basic LLDP TLV. IPv4 address of host interface.
Chassis ID	Mandatory basic LLDP TLV that identifies the chassis transmitting the LLDPDU. Value is MAC address of chassis.
Sys Name	Optional basic LLDP TLV. Value is the administratively assigned name for the system.
Sys Desc	Optional basic LLDP TLV. Value is sysDescr object defined in RFC 3418.
Sys Cap Supported/Enabled	Optional basic LLDP TLV. System capabilities, value can be bridge and/or router.
Auto-Neg Supported/Enabled	IEEE 802.3 Extensions MAC-PHY Configuration/Status TLV. Auto-negotiation supported and enabled settings should be the same on the two systems attached to the same link.
Auto-Neg Advertised	IEEE 802.3 Extensions MAC-PHY Configuration/Status TLV. Lists the configured advertised values on the port.
Operational Speed/Duplex/ Type	IEEE 802.3 Extensions MAC-PHY Configuration/Status TLV. Lists the operational MAU type, duplex, and speed of the port. If the received TLV indicates that auto-negotiation is supported but not enabled, these values will be used by the port.
Max Frame Size (bytes)	IEEE 802.3 Extensions Maximum Frame Size TLV. Value indicates maximum frame size capability of the device's MAC and PHY. In normal mode, max frame size is 1522 bytes. In jumbo mode, max frame size is 10239 bytes.
Vlan Id	IEEE 802.1 Extensions Port VLAN ID TLV. Value is port VLAN ID (pvid).
LAG Supported/Enabled/Id	IEEE 802.3 Extensions Link Aggregation TLV. Values indicate whether the link associated with this port can be aggregated, whether it is currently aggregated, and if aggregated, the aggregated port identifier.
Protocol Id	IEEE 802.1 Extensions Protocol Identity TLV. Values can include Spanning tree, LACP, and GARP protocols and versions. Only those protocols enabled on the port are displayed.
ECS ELIN	LLDP-MED Extensions Location Identification TLV. Emergency Call Services (ECS) Emergency Location Identification Number (ELIN) is currently the only type supported. Value is the ELIN configured on this port.
PoE Device	LLDP-MED Extensions Extended Power via MDI TLV. Displayed only when a port has PoE capabilities. Value is the Power Type of the device. On a switch port, the value is Power Sourcing Entity (PSE).
PoE Power Source	LLDP-MED Extensions Extended Power via MDI TLV. Displayed only when a port has PoE capabilities. Value can be primary or backup, indicating whether the PSE is using its primary or backup power source.
PoE MDI Supported/Enabled	IEEE 802.3 Extensions Power via MDI TLV. Displayed only when a port has PoE capabilities. Indicates whether sending the Power via MDI TLV is supported/enabled. Value can be yes or no.

Table 6-5 show lldp port local-info Output Details (Continued)

Output Field	What it Displays...
PoE Pair Controllable/Used	IEEE 802.3 Extensions Power via MDI TLV. Displayed only when a port has PoE capabilities. Indicates whether pair selection can be controlled on the given port (refer to RFC 3621). Value for Controllable can be true or false. Value of Used can be signal (signal pairs only are in use) or spare (spare pairs only are in use).
PoE Power Class	IEEE 802.3 Extensions Power via MDI TLV. Displayed only when a port has PoE capabilities. Indicates the power class supplied by the port. Value can range from 0 to 4.
PoE Power Limit (mW)	LLDP-MED Extensions Extended Power via MDI TLV. Displayed only when a port has PoE capabilities. Indicates the total power the port is capable of sourcing over a maximum length cable, based on its current configuration, in milli-Watts.
PoE Power Priority	LLDP-MED Extensions Extended Power via MDI TLV. Displayed only when a port has PoE capabilities. Indicates the power priority configured on the port. Value can be critical, high, or low.

show lldp port remote-info

Use this command to display the remote system information stored for a remote device connected to a local port. You can use this information to detect misconfigurations or incompatibilities between the local port and the attached endpoint device (remote port).

Syntax

`show lldp port remote-info` [*`port-string`*]

Parameters

port-string	(Optional) Displays remote system information for one or a range of ports.

Defaults

If *port-string* is not specified, remote system information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display the remote system information stored for port fe.3.1. The remote system information was received from an IP phone, which is an LLDP-MED-enabled device. Table 6-6 describes the output fields that are unique to the remote system information displayed for a MED-enabled device.

```
B2(ro)->show lldp port remote-info fe.3.1
Local Port  : fe.3.1     Remote Port Id : 00-09-6e-0e-14-3d
---------------------
Mgmt Addr   : 0.0.0.0
Chassis ID  : 0.0.0.0
Device Type : Communication Device Endpoint (class III)
Sys Name    : AVE0E143D
Sys Cap Supported/Enabled     : bridge,telephone/bridge

Auto-Neg Supported/Enabled    : yes/yes
Auto-Neg Advertised           : 10BASE-T, 10BASE-TFD
                              : 100BASE-TX, 100BASE-TXFD
                              : pause, Spause

Operational Speed/Duplex/Type : 100/full/TX

Hardware Revision             : 4610D01A
Firmware Revision             : b10d01b2_7.bin
Software Revision             : a10d01b2_7.bin
Serial Number                 : 05GM42004348
Manufacturer                  : Avaya
Model Number                  : 4610
```

Note that the information fields displayed by the **show lldp port remote-info** command will vary, depending on the type of remote device that is connected to the port.

Table 6-6 describes the output fields that are unique to the remote system information database. Refer to Table 6-5 on page 19 for descriptions of the information fields that are common to both the local and the remote system information databases.

Table 6-6 show lldp port remote-info Output Display

Output Field	What it Displays...
Remote Port Id	Displays whatever port Id information received in the LLDPDU from the remote device. In this case, the port Id is MAC address of remote device.
Device Type	Mandatory LLDP-MED Capabilities TLV. Displayed only when the port is connected to an LLDP-MED-capable endpoint device.
Hardware Revision	LLDP-MED Extensions Inventory Management TLV component.
Firmware Revision	LLDP-MED Extensions Inventory Management TLV component.
Software Revision	LLDP-MED Extensions Inventory Management TLV component.
Serial Number	LLDP-MED Extensions Inventory Management TLV component.
Manufacturer	LLDP-MED Extensions Inventory Management TLV component.
Model Number	LLDP-MED Extensions Inventory Management TLV component.
Asset ID	LLDP-MED Extensions Inventory Management TLV component. In the above example, no asset ID was received from the remote device so the field is not displayed.

set lldp tx-interval

Use this command to set the time, in seconds, between successive LLDP frame transmissions initiated by changes in the LLDP local system information.

Syntax

set lldp tx-interval *frequency*

Parameters

frequency	Specifies the number of seconds between transmissions of LLDP frames. Value can range from 5 to 32,768 seconds. The default is 30 seconds.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the transmit interval to 20 seconds.

```
B2(rw)->set lldp tx-interval 20
```

set lldp hold-multiplier

Use this command to set the time-to-live value used in LLDP frames sent by this device. The time-to-live for LLDPDU data is calculated by multiplying the transmit interval by the hold multiplier value.

Syntax

set lldp hold-multiplier *multiplier-val*

Parameters

multiplier-val	Specifies the multiplier to apply to the transmit interval to determine the time-to-live value. Value can range from 2 to 10. Default value is 4.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the transmit interval to 20 seconds and the hold multiplier to 5, which will configure a time-to-live of 100 to be used in the TTL field in the LLDPDU header.

```
B2(rw)->set lldp tx-interval 20
B2(rw)->set lldp hold-multiplier 5
```

set lldp trap-interval

Use this command to set the minimum interval between LLDP notifications sent by this device. LLDP notifications are sent when a remote system change has been detected.

Syntax

set lldp trap-interval *frequency*

Parameters

frequency	Specifies the minimum time between LLDP trap transmissions, in seconds. The value can range from 5 to 3600 seconds. The default value is 5 seconds.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the minimum interval between LLDP traps to 10 seconds.

```
B2(rw)->set lldp trap-interval 10
```

set lldp med-fast-repeat

Network connectivity devices transmit only LLDP TLVs in LLDPDUs until they detect that an LLDP-MED endpoint device has connected to a port. At that point, the network connectivity device starts sending LLDP-MED TLVs at a fast start rate on that port. Use this command to set the number of successive LLDPDUs (with LLDP-MED TLVs) to be sent for one complete fast start interval.

Syntax

set lldp med-fast-repeat *count*

Parameters

count	Specifies the number of fast start LLDPDUs to be sent when an LLDP-MED endpoint device is detected. Value can range from 1 to 10. Default is 3.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the number of fast start LLDPDUs to be sent to 4.

```
B2(rw)->set lldp med-fast-repeat 4
```

set lldp port status

Use this command to enable or disable transmitting and processing received LLDPDUs on a port or range of ports.

Syntax

set lldp port status {**tx-enable** | **rx-enable** | **both** | **disable**} *port-string*

Parameters

tx-enable	Enables transmitting LLDPDUs on the specified ports.
rx-enable	Enables receiving and processing LLDPDUs from remote systems on the specified ports.
both	Enables both transmitting and processing received LLDPDUs on the specified ports.
disable	Disables both transmitting and processing received LLDPDUs on the specified ports.
port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example enables both transmitting LLDPDUs and receiving and processing LLDPDUs from remote systems on ports fe.1.1 through fe.1.6.

```
B2(rw)->set lldp port status both fe.1.1-6
```

set lldp port trap

Use this command to enable or disable sending LLDP notifications (traps) when a remote system change is detected.

Syntax

set lldp port trap {**enable** | **disable**} *port-string*

Parameters

enable	Enable transmitting LLDP traps on the specified ports.
disable	Disable transmitting LLDP traps on the specified ports.
port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example enables transmitting LLDP traps on ports fe.1.1 through fe.1.6.

```
B2(rw)->set lldp port trap enable fe.1.1-6
```

set lldp port med-trap

Use this command to enable or disable sending an LLDP-MED notification when a change in the topology has been sensed on the port (that is, a remote endpoint device has been attached or removed from the port).

Syntax

set lldp port med-trap {**enable** | **disable**} *port-string*

Parameters

enable	Enables transmitting LLDP-MED traps on the specified ports.
disable	Disables transmitting LLDP-MED traps on the specified ports.
port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example enables transmitting LLDP-MED traps on ports fe.1.1 through fe.1.6.

```
B2(rw)->set lldp port med-trap enable fe.1.1-6
```

set lldp port tx-tlv

Use this command to select the optional LLDP and LLDP-MED TLVs to be transmitted in LLDPDUs by the specified port or ports. Use the show lldp port local-info command to display the values of these TLVs for the port.

Syntax

set lldp port tx-tlv {[**all**] | [**port-desc**] [**sys-name**] [**sys-desc**] [**sys-cap**] [**mgmt-addr**] [**vlan-id**] [**stp**] [**lacp**] [**gvrp**] [**mac-phy**] [**poe**] [**link-aggr**] [**max-frame**] [**med-cap**] [**med-loc**] [**med-poe**]} *port-string*

Parameters

all	Adds all optional TLVs to transmitted LLDPDUs.
port-desc	Port Description optional basic LLDP TLV. Value sent is ifDescr object defined in RFC 2863.
sys-name	System Name optional basic LLDP TLV. Value sent is the administratively assigned name for the system.
sys-desc	System Description optional basic LLDP TLV. Value sent is sysDescr object defined in RFC 3418.
sys-cap	System Capabilities optional basic LLDP TLV. For a network connectivity device, value sent can be bridge and/or router.
mgmt-addr	Management Address optional basic LLDP TLV. Value sent is IPv4 address of host interface.
vlan-id	Port VLAN ID IEEE 802.1 Extensions TLV. Value sent is port VLAN ID (PVID).
stp	Spanning Tree information defined by Protocol Identity IEEE 802.1 Extensions TLV. If STP is enabled on the port, value sent includes version of protocol being used.
lacp	LACP information defined by Protocol Identity IEEE 802.1 Extensions TLV. If LACP is enabled on the port, value sent includes version of protocol being used.
gvrp	GVRP information defined by Protocol Identity IEEE 802.1 Extensions TLV. If LACP is enabled on the port, value sent includes version of protocol being used.
mac-phy	MAC-PHY Configuration/Status IEEE 802.3 Extensions TLV. Value sent includes the operational MAU type, duplex, and speed of the port.
poe	Power via MDI IEEE 802.3 Extensions TLV. Values sent include whether pair selection can be controlled on port, and the power class supplied by the port. Only valid for PoE-enabled ports.
link-aggr	Link Aggregation IEEE 802.3 Extensions TLV. Values sent indicate whether the link associated with this port can be aggregated, whether it is currently aggregated, and if aggregated, the aggregated port identifier.
max-frame	Maximum Frame Size IEEE 802.3 Extensions TLV. Value sent indicates maximum frame size of the port's MAC and PHY.
med-cap	LLDP-MED Capabilities TLV.Value sent indicates the capabilities (whether the device supports location information, extended power via MDI) and Device Type (network connectivity device) of the sending device.
med-loc	LLDP-MED Location Identification TLV. Value sent is the ECS ELIN value configured on the port.
med-poe	LLDP-MED Extended Power via MDI TLV. Values sent include the Power Limit (total power the port is capable of sourcing over a maximum length cable) and the power priority configured on the port. Only valid for PoE-enabled ports.
port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example configures the management address, MED capability, and MED location identification TLVs to be sent in LLDPDUs by port `fe.1.1`.

```
B2(rw)->set lldp port tx-tlv mgmt-addr med-cap med-loc fe.1.1
```

clear lldp

Use this command to return LLDP parameters to their default values.

Syntax

`clear lldp` {**`all`** | **`tx-interval`** | **`hold-multiplier`** | **`trap-interval`** | **`med-fast-repeat`**}

Parameters

all	Returns **all** LLDP configuration parameters to their default values, including port LLDP configuration parameters.
tx-interval	Returns the number of seconds between transmissions of LLDP frames.to the default of 30 seconds.
hold-multiplier	Returns the multiplier to apply to the transmit interval to determine the time-to-live value to the default value of 4.
trap-interval	Returns the minimum time between LLSP trap transmissions to the default value of 5 seconds.
med-fast-repeat	Returns the number of fast start LLDPDUs to be sent when an LLDP-MED endpoint device is detected to the default of 3.

Defaults

None.

Mode

Switch command, read-write.

Example

This example returns the transmit interval to the default value of 30 seconds.

```
B2(rw)->clear lldp tx-interval
```

clear lldp port status

Use this command to return the port status to the default value of both (both transmitting and processing received LLDPDUs are enabled).

Syntax

clear lldp port status *port-string*

Parameters

port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example returns port `fe.1.1` to the default state of enabled for both transmitting and processing received LLDPDUs.

```
B2(rw)->clear lldp port status fe.1.1
```

clear lldp port trap

Use this command to return the port LLDP trap setting to the default value of disabled.

Syntax

clear lldp port trap *port-string*

Parameters

port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example returns port `fe.1.1` to the default LLDP trap state of disabled.

```
B2(rw)->clear lldp port trap fe.1.1
```

clear lldp port med-trap

Use this command to return the port LLDP-MED trap setting to the default value of disabled.

Syntax

clear lldp port med-trap *port-string*

Parameters

port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example returns port `fe.1.1` to the default LLDP-MED trap state of disabled.

```
B2(rw)->clear lldp port med-trap fe.1.1
```

clear lldp port tx-tlv

Use this command to clear the optional LLDP and LLDP-MED TLVs to be transmitted in LLDPDUs by the specified port or ports to the default value of disabled.

Syntax

clear lldp port tx-tlv {[**all**] | [**port-desc**] [**sys-name**] [**sys-desc**] [**sys-cap**] [**mgmt-addr**] [**vlan-id**] [**stp**] [**lacp**] [**gvrp**] [**mac-phy**] [**poe**] [**link-aggr**] [**max-frame**] [**med-cap**] [**med-loc**] [**med-poe**]} *port-string*

Parameters

all	Disables all optional TLVs from being transmitted in LLDPDUs.
port-desc	Disables the Port Description optional basic LLDP TLV from being transmitted in LLDPDUs.
sys-name	Disables the System Name optional basic LLDP TLV from being transmitted in LLDPDUs.
sys-desc	Disables the System Description optional basic LLDP TLV from being transmitted in LLDPDUs.
sys-cap	Disables the System Capabilities optional basic LLDP TLV from being transmitted in LLDPDUs.
mgmt-addr	Disables the Management Address optional basic LLDP TLV from being transmitted in LLDPDUs.
vlan-id	Disables the Port VLAN ID IEEE 802.1 Extensions TLV from being transmitted in LLDPDUs.
stp	Disables the Spanning Tree information defined by Protocol Identity IEEE 802.1 Extensions TLV from being transmitted in LLDPDUs.
lacp	Disables the LACP information defined by Protocol Identity IEEE 802.1 Extensions TLV from being transmitted in LLDPDUs.
gvrp	Disables the GVRP information defined by Protocol Identity IEEE 802.1 Extensions TLV from being transmitted in LLDPDUs.
mac-phy	Disables the MAC-PHY Configuration/Status IEEE 802.3 Extensions TLV from being transmitted in LLDPDUs.

poe	Disables the Power via MDI IEEE 802.3 Extensions TLV from being transmitted in LLDPDUs. Only valid for PoE-enabled ports.
link-aggr	Disables the Link Aggregation IEEE 802.3 Extensions TLV from being transmitted in LLDPDUs.
max-frame	Disables the Maximum Frame Size IEEE 802.3 Extensions TLV from being transmitted in LLDPDUs.
med-cap	Disables the LLDP-MED Capabilities TLV from being transmitted in LLDPDUs.
med-loc	Disables the LLDP-MED Location Identification TLV from being transmitted in LLDPDUs.
med-poe	Disables the LLDP-MED Extended Power via MDI TLV from being transmitted in LLDPDUs. Only valid for PoE-enabled ports.
port-string	Specifies the port or range of ports to be affected.

Defaults

None.

Mode

Switch command, read-write.

Example

This example disables the management address, MED capability, and MED location identification TLVs from being sent in LLDPDUs by port `fe.1.1`.

```
B2(rw)->clear lldp port tx-tlv mgmt-addr med-cap med-loc fe.1.1
```

7 Port Configuration

This chapter describes the Port Configuration set of commands and how to use them.

For information about...	Refer to page...
Port Configuration Summary	7-1
Reviewing Port Status	7-3
Disabling / Enabling and Naming Ports	7-6
Setting Speed and Duplex Mode	7-10
Enabling / Disabling Jumbo Frame Support	7-13
Setting Auto-Negotiation and Advertised Ability	7-15
Setting Flow Control	7-19
Setting Port Link Traps and Link Flap Detection	7-21
Configuring Broadcast Suppression	7-30
Port Mirroring	7-33
Link Aggregation Control Protocol (LACP)	7-38
Configuring Protected Ports	7-52

Port Configuration Summary

B2H124-48 and B2H124-48P Switch Ports

The B2H124-48 and B2H124-48P stackable devices provide the following types of front panel connections:

- 48 fixed RJ45 10/100 Mbps copper Fast Ethernet ports
- 4 SFP slots (labeled ports 49 through 52) that provide the option of installing Small Form Pluggable (SFP) Mini-GBICs for 1000BASE-T compliant copper connections or 1000BASE-SX\LX\ELX fiber-optic connections

B2G124-24, B2G124-48, and B2G124-48P Switch Ports

The B2G124-24, B2G124-48 and B2G124-48P stackable devices provide the following types of switch port connections:

- 24 or 48 RJ45 10/100/1000 Mbps 1000BASE-T Gigabit Ethernet copper ports

- 4 SFP slots (labeled ports 21 through 24 or ports 45 through 48) that provide the option of installing Small Form Pluggable (SFP) Mini-GBICs for 1000BASE-T compliant copper connections or 1000BASE-SX\LX\ELX fiber-optic connections.

Important Notice About B2Gxxx-xx 10/100/100 and SFP Mini-GBIC Ports

SFP Mini-GBIC uplink ports are used in an either / or configuration with their corresponding RJ45 10/100/1000 Mbps 1000BASE-T Gigabit Ethernet copper ports. If all Mini-GBIC ports are used, the four corresponding RJ45 ports will be disabled. The maximum number of active ports can be 24 on the B2G124-24, and 48 on the B2G124-48 and B2G124-48P, in any combination of RJ45s and Mini-GBICs. This does not apply to the B2Hxxx-xx switches.

Port String Syntax Used in the CLI

Commands requiring a *port-string* parameter use the following syntax to designate port type, slot location, and port number:

port type.unit_or_slot number.port number

Where **port type** can be:
fe for 100-Mbps Ethernet
ge for 1-Gbps Ethernet
tg for 10-Gbps Ethernet
host for the host port
vlan for vlan interfaces
lag for IEEE802.3 link aggregation ports

Where unit_or_slotnumber can be:
1 - **8** for switch units in a stack

Where **port number** depends on the device. The highest valid port number is dependent on the number of ports in the device and the port type.

Port Slot/Unit Parameters Used in the CLI

The “unit” parameter is often used interchangeably with “module” in the standalone switch CLI to indicate a module slot location.

Examples

Note: You can use a wildcard (*) to indicate all of an item. For example, fe.3.* would represent all 100Mbps Ethernet (fe) ports in slot 3, and ge.3 * would represent all 1-Gigabit Ethernet (ge) ports in slot 3.

This example shows the *port-string* syntax for specifying the 1-Gigabit Ethernet port 14 in slot unit 3.

```
ge.3.14
```

This example shows the *port-string* syntax for specifying all 1-Gigabit Ethernet ports in slot unit 3 in the system.

```
ge.3.*
```

This example shows the *port-string* syntax for specifying all ports (of any interface type) in the system.

```
*.*.*
```

Reviewing Port Status

Purpose

To display operating status, duplex mode, speed, port type, and statistical information about traffic received and transmitted through one or all switch ports on the device.

Commands

For information about...	Refer to page...
show port	7-3
show port status	7-4
show port counters	7-5

show port

Use this command to display whether or not one or more ports are enabled for switching.

Syntax

show port [*port-string*]

Parameters

port-string	(Optional) Displays operational status for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, operational status information for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display operational status information for fe.3.14:

```
B2(su)->show port fe.3.14
Port fe.3.14 enabled
```

show port status

Use this command to display operating and admin status, speed, duplex mode and port type for one or more ports on the device.

Syntax

show port status [*port-string*]

Parameters

port-string	(Optional) Displays status for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, status information for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display status information for fe.3.14:

```
B2(su)->show port status fe.3.14

Port          Alias          Oper      Admin    Speed     Duplex   Type
             (truncated)      Status   Status
------------  --------------  -------  -------  --------  -------  -------------
fe.3.14                      up        up        N/A      N/A      BaseT RJ45
```

Table 7-7 provides an explanation of the command output.

Table 7-7 show port status Output Details

Output Field	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
Alias (truncated)	Alias configured for the port. For details on using the **set port alias** command, refer to "set port alias" on page 7-8.
Oper Status	Operating status (up or down).
Admin Status	Whether the specified port is enabled (up) or disabled (down). For details on using the **set port disable** command to change the default port status of enabled, refer to "set port disable" on page 7-7. For details on using the **set port enable** command to re-enable ports, refer to "set port enable" on page 7-7.
Speed	Operational speed in Mbps or Kbps of the specified port. For details on using the **set port speed** command to change defaults, refer to "set port speed" on page 7-11.
Duplex	Duplex mode (half or full) of the specified port. For details on using the **set port duplex** command to change defaults, refer to "Setting Auto-Negotiation and Advertised Ability" on page 7-15.
Type	Physical port and interface type.

show port counters

Use this command to display port counter statistics detailing traffic through the device and through all MIB2 network devices.

Syntax

show port counters [*port-string*] [**switch** | **mib2**]

Parameters

port-string	(Optional) Displays counter statistics for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
switch | **mib2**	(Optional) Displays switch or MIB2 statistics. Switch statistics detail performance of the SecureStack B2 device. MIB2 interface statistics detail performance of all network devices.

Defaults

If *port-string* is not specified, counter statistics will be displayed for all ports.

If **mib2** or **switch** are not specified, all counter statistics will be displayed for the specified port(s).

Mode

Switch command, read-only.

Examples

This example shows how to display all counter statistics, including MIB2 network traffic and traffic through the device for fe.3.1:

```
B2(su)->show port counters fe.3.1

Port: fe.3.1   MIB2 Interface: 1
No counter discontinuity time
-----------------------------------------------------------------

MIB2 Interface Counters
-----------------------
In Octets                       0
In Unicast Pkts                 0
In Multicast Pkts               0
In Broadcast Pkts               0
In Discards                     0
In Errors                       0
Out Octets                      0
Out Unicasts Pkts               0
Out Multicast Pkts              0
Out Broadcast Pkts              0
Out Errors                      0

802.1Q Switch Counters
----------------------
Frames Received                 0
Frames Transmitted              0
```

This example shows how to display all fe.3.1 port counter statistics related to traffic through the device.

```
B2(su)->show port counters fe.3.1 switch

Port: fe.3.1          Bridge Port: 2

802.1Q Switch Counters
----------------------
Frames Received                   0
Frames Transmitted                0
```

Table 7-8 provides an explanation of the command output.

Table 7-8 show port counters Output Details

Output Field	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
MIB2 Interface	MIB2 interface designation.
Bridge Port	IEEE 802.1D bridge port designation.
MIB2 Interface Counters	MIB2 network traffic counts
802.1Q Switch Counters	Counts of frames received, transmitted, and filtered.

Disabling / Enabling and Naming Ports

Purpose

To disable and re-enable one or more ports, and to assign an alias to a port. By default, all ports are enabled at device startup. You may want to disable ports for security or to troubleshoot network issues. Ports may also be assigned an alias for convenience.

Commands

For information about...	Refer to page...
set port disable	7-7
set port enable	7-7
show port alias	7-8
set port alias	7-8

set port disable

Use this command to administratively disable one or more ports. When this command is executed, in addition to disabling the physical Ethernet link, the port will no longer learn entries in the forwarding database.

Syntax

set port disable *port-string*

Parameters

port-string	Specifies the port(s) to disable. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to disable fe.1.1:

```
B2(su)->set port disable fe.1.1
```

set port enable

Use this command to administratively enable one or more ports.

Syntax

set port enable *port-string*

Parameters

port-string	Specifies the port(s) to enable. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable fe.1.3:

```
B2(su)->set port enable fe.1.3
```

show port alias

Use this command to display the alias name for one or more ports.

Syntax

show port alias [*port-string*]

Parameters

port-string	(Optional) Displays alias name(s) for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If port-string is not specified, aliases for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display alias information for ports 1-3 on slot 3:

```
B2(rw)->show port alias fe.3.1-3
Port  fe.3.1 user
Port  fe.3.2 user
Port  fe.3.3 Admin
```

set port alias

Use this command to assign an alias name to a port.

Syntax

set port alias *port-string* [*name*]

Parameters

port-string	Specifies the port to which an alias will be assigned. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
name	(Optional) Assigns an alias name to the port. If the alias name contains spaces, the text string must be surrounded by double quotes. Maximum length is 60 characters.

Defaults

If *name* is not specified, the alias assigned to the port will be cleared.

Mode

Switch command, read-write.

Examples

This example shows how to assign the alias “Admin” to `fe.3.3`:

```
B2(rw)->set port alias fe.3.3 Admin
```

This example shows how to clear the alias for `fe.3.3`:

```
B2(rw)->set port alias fe.3.3
```

Setting Speed and Duplex Mode

Purpose

To review and set the operational speed in Mbps and the default duplex mode: **Half**, for half duplex, or **Full**, for full duplex for one or more ports.

Note: These settings only take effect on ports that have auto-negotiation disabled.

Commands

For information about...	Refer to page...
show port speed	7-10
set port speed	7-11
show port duplex	7-11
set port duplex	7-15

show port speed

Use this command to display the default speed setting on one or more ports.

Syntax

`show port speed` [*`port-string`*]

Parameters

port-string	(Optional) Displays default speed setting(s) for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, default speed settings for all ports will display.

Mode

Switch command, read-only.

Example

This example shows how to display the default speed setting for 1-Gigabit Ethernet port 14 in slot 3:

```
B2(su)->show port speed fe.3.14
default speed is 10 on port fe.3.14.
```

set port speed

Use this command to set the default speed of one or more ports. This setting only takes effect on ports that have auto-negotiation disabled.

Syntax

set port speed *port-string* {**10** | **100** | **1000**}

Parameters

port-string	Specifies the port(s) for which to a speed value will be set. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
10 | **100** | **1000**	Specifies the port speed. Valid values are: **10** Mbps, **100** Mbps, or **1000** Mbps.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set fe.3.3 to a port speed of 10 Mbps:

```
B2(su)->set port speed fe.3.3 10
```

show port duplex

Use this command to display the default duplex setting (half or full) for one or more ports.

Syntax

show port duplex [*port-string*]

Parameters

port-string	(Optional) Displays default duplex setting(s) for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, default duplex settings for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the default duplex setting for Ethernet port 14 in slot 3:

```
B2(su)->show port duplex fe.3.14
default duplex mode is full on port fe.3.14.
```

set port duplex

Use this command to set the default duplex type for one or more ports. This command will only take effect on ports that have auto-negotiation disabled.

Syntax

set port duplex *port-string* {**full** | **half**}

Parameters

port-string	Specifies the port(s) for which duplex type will be set. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
full | **half**	Sets the port(s) to full-duplex or half-duplex operation.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set fe.1.17 to full duplex:

```
B2(su)->set port duplex fe.1.17 full
```

Enabling / Disabling Jumbo Frame Support

Purpose

To review, enable, and disable jumbo frame support on one or more ports. This allows Gigabit Ethernet ports to transmit frames up to 10 KB in size.

Commands

For information about...	Refer to page...
show port jumbo	7-13
set port jumbo	7-14
clear port jumbo	7-14

show port jumbo

Use this command to display the status of jumbo frame support and maximum transmission units (MTU) on one or more ports.

Syntax

show port jumbo [*port-string*]

Parameters

port-string	(Optional) Displays the status of jumbo frame support for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, jumbo frame support status for all ports will display.

Mode

Switch command, read-only.

Example

This example shows how to display the status of jumbo frame support for `fe.1.1`:

```
B2(su)->show port jumbo fe.1.1

Port Number   Jumbo Status    Max Frame Size
------------- --------------- ------------------
fe.1.1        Enable          9216
```

set port jumbo

Use this command to enable or disable jumbo frame support on one or more ports.

Syntax

set port jumbo {**enable** | **disable**}[*port-string*]

Parameters

enable | **disable**	Enables or disables jumbo frame support.
port-string	(Optional) Specifies the port(s) on which to disable or enable jumbo frame support. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, jumbo frame support will be enabled or disabled on all ports.

Mode

Switch command, read-write.

Example

This example shows how to enable jumbo frame support for Gigabit Ethernet port 14 in slot 3:

```
B2(su)->set port jumbo enable fe.3.14
```

clear port jumbo

Use this command to reset jumbo frame support status to enabled on one or more ports.

Syntax

clear port jumbo [*port-string*]

Parameters

port-string	(Optional) Specifies the port(s) on which to reset jumbo frame support status to enabled. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, jumbo frame support status will be reset on all ports.

Mode

Switch command, read-write.

Example

This example shows how to reset jumbo frame support status for Gigabit Ethernet port 14 in slot 3:

```
B2(su)->clear port jumbo fe.3.14
```

Setting Auto-Negotiation and Advertised Ability

Purpose

To review, disable or enable auto-negotiation, and to configure port advertisement for speed and duplex.

During auto-negotiation, the port "tells" the device at the other end of the segment what its capabilities and mode of operation are. If auto-negotiation is disabled, the port reverts to the values specified by default speed, default duplex, and the port flow control commands.

In normal operation, with all capabilities enabled, advertised ability enables a port to "advertise" that it has the ability to operate in any mode. The user may choose to configure a port so that only a portion of its capabilities are advertised and the others are disabled.

Note: Advertised ability can be activated only on ports that have auto-negotiation enabled.

Commands

For information about...	Refer to page...
show port negotiation	7-15
set port negotiation	7-16
show port advertise	7-16
set port advertise	7-17
clear port advertise	7-18

show port negotiation

Use this command to display the status of auto-negotiation for one or more ports.

Syntax

`show port negotiation` [*`port-string`*]

Parameters

port-string	(Optional) Displays auto-negotiation status for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, auto-negotiation status for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display auto-negotiation status for 1-Gigabit Ethernet port 14 in slot 3:

```
B2(su)->show port negotiation fe.3.14
auto-negotiation is enabled on port fe.3.14.
```

set port negotiation

Use this command to enable or disable auto-negotiation on one or more ports.

Syntax

set port negotiation *port-string* {**enable** | **disable**}

Parameters

port-string	Specifies the port(s) for which to enable or disable auto-negotiation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
enable | **disable**	Enables or disables auto-negotiation.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to disable auto-negotiation on 1-Gigabit Ethernet port 3 in slot 14:

```
B2(su)->set port negotiation fe.3.14 disable
```

show port advertise

Use this command to display port capability and advertisement as far as speed and duplex for auto-negotiation.

Syntax

show port advertise [*port-string*]

Parameters

port-string	(Optional) Displays advertised ability for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, advertisement for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display advertisement status for Gigabit ports 13 and 14:

```
B2(su)->show port advertise fe.1.13-14
fe.1.13      capability    advertised     remote
-----------------------------------------------
10BASE-T        yes           yes          yes
10BASE-TFD      yes           yes          yes
100BASE-TX      yes           yes          yes
100BASE-TXFD    yes           yes          yes
1000BASE-T      no            no           no
1000BASE-TFD    yes           yes          yes
pause           yes           yes          no

fe.1.14      capability    advertised     remote
-----------------------------------------------
10BASE-T        yes           yes          yes
10BASE-TFD      yes           yes          yes
100BASE-TX      yes           yes          yes
100BASE-TXFD    yes           yes          yes
1000BASE-T      no            no           no
1000BASE-TFD    yes           yes          yes
pause           yes           yes          no
```

set port advertise

Use this command to configure what a port will advertise for speed/duplex capabilities in auto-negotiation.

Syntax

set port advertise {*port-string*}{**10t** | **10tfd** | **100tx** | **100txfd** | **1000t** | **1000tfd** | **pause**}

Parameters

port-string	Select the ports for which to configure advertisements. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
10t	Advertise 10BASE-T half duplex mode.
10tfd	Advertise 10BASE-T full duplex mode.
100tx	Advertise 100BASE-TX half duplex mode.
100txfd	Advertise 100BASE-TX full duplex mode.
1000t	Advertise 1000BASE-T half duplex mode.
1000tfd	Advertise 1000BASE-T full duplex mode.
pause	Advertise PAUSE for full-duplex links.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to configure port 1 to advertise 1000BASE-T full duplex:

```
B2(su)->set port advertise fe.1.1 1000tfd
```

clear port advertise

Use this command to configure a port to not advertise a specific speed/duplex capability when auto-negotiating with another port.

Syntax

clear port advertise {*port-string*}{**10t** | **10tfd** | **100tx** | **100txfd** | **1000t** | **1000tfd** | **pause**}

Parameters

port-string	Clear advertisements for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
10t	Do not advertise 10BASE-T half duplex mode.
10tfd	Do not advertise 10BASE-T full duplex mode.
100tx	Do not advertise 100BASE-TX half duplex mode.
100txfd	Do not advertise 100BASE-TX full duplex mode.
1000t	Do not advertise 1000BASE-T half duplex mode.
1000tfd	Do not advertise 1000BASE-T full duplex mode.
pause	Do not advertise PAUSE for full-duplex links.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to configure port 1 to not advertise 10 MB capability for auto-negotiation:

```
B2(su)->clear port advertise fe.1.1 10t 10tfd
```

Setting Flow Control

Purpose

To review, enable or disable port flow control. Flow control is used to manage the transmission between two devices as specified by IEEE 802.3x to prevent receiving ports from being overwhelmed by frames from transmitting devices.

Commands

For information about...	Refer to page...
show flowcontrol	7-19
set flowcontrol	7-19

show flowcontrol

Use this command to display the flow control state.

Syntax

show flowcontrol

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the port flow control state:

```
B2(su)->show flowcontrol
Flow control status: enabled
```

set flowcontrol

Use this command to enable or disable flow control.

Syntax

set flowcontrol {**enable** | **disable**}

Parameters

enable | **disable**	Enables or disables flow control settings.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable flow control:

```
B2(su)->set flowcontrol enable
```

Setting Port Link Traps and Link Flap Detection

Purpose

To disable or re-enable link traps, display link trap status, and to configure the link flapping detection function. By default, all ports are enabled to send SNMP trap messages indicating changes to their link status (up or down).

The link flap function detects when a link is going up and down rapidly (also called "link flapping") on a physical port, and takes the required actions (disable port, and eventually send notification trap) to stop such a condition. If left unresolved, the "link flapping" condition can be detrimental to network stability because it can trigger Spanning Tree and routing table recalculation.

Commands

For information about...	Refer to page...
show port trap	7-21
set port trap	7-22
show linkflap	7-22
set linkflap globalstate	7-25
set linkflap portstate	7-25
set linkflap interval	7-26
set linkflap action	7-26
clear linkflap action	7-27
set linkflap threshold	7-27
set linkflap downtime	7-28
clear linkflap down	7-28
clear linkflap	7-29

show port trap

Use this command to display whether the port is enabled for generating an SNMP trap message if its link state changes.

Syntax

`show port trap` [*`port-string`*]

Parameters

port-string	(Optional) Displays link trap status for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, the trap status for all ports will be displayed.

Mode

Switch command, read-write.

Example

This example shows how to display link trap status for fe.3.1 through 4:

```
B2(su)->show port trap fe.3.1-4
Link traps enabled on port fe.3.1.
Link traps enabled on port fe.3.2.
Link traps enabled on port fe.3.3.
Link traps enabled on port fe.3.4.
```

set port trap

Use this command to enable of disable ports for sending SNMP trap messages when their link status changes.

Syntax

set port trap *port-string* {**enable** | **disable**}

Parameters

port-string	Specifies the port(s) for which to enable or disable port traps. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
enable | **disable**	Enables or disables sending trap messages when link status changes.

Defaults

Sending traps when link status changes is enabled by default.

Mode

Switch command, read-write.

Example

The following example disables sending trap on fe.3.1.

```
B2(su)->set port trap fe.3.1 disable
```

show linkflap

Use this command to display link flap detection state and configuration information.

Syntax

show linkflap {**globalstate** | **portstate** | **parameters** | **metrics** | **portsupported** | **actsupported** | **maximum** | **downports** | **action** | **operstatus** | **threshold** | **interval**] | **downtime** | **currentcount** | **totalcount** | **timelapsed** | **violations** [*port-string*]}

Parameters

globalstate	Displays the global enable state of link flap detection.
portstate	Displays the port enable state of link flap detection.
parameters	Displays the current value of settable link flap detection parameters.
metrics	Displays linkflap detection metrics.
portsupported	Displays ports which can support the link flap detection function.
actsupported	Displays link flap detection actions supported by system hardware.
maximum	Displays the maximum allowed linkdowns per 10 seconds supported by system hardware.
downports	Displays ports disabled by link flap detection due to a violation.
action	Displays linkflap actions taken on violating port(s).
operstatus	Displays whether linkflap has deactivated port(s).
threshold	Displays the number of allowed link down transitions before action is taken.
interval	Displays the time period for counting link down transitions.
downtime	Displays how long violating port(s) are deactivated.
currentcount	Displays how many linkdown transitions are in the current interval.
totalcount	Displays how many linkdown transitions have occurred since the last reset.
timelapsed	Displays the time period since the last link down event or reset.
violations	Displays the number of link flap violations since the last reset.
port-string	(Optional) Displays information for specific port(s).

Defaults

- If not specified, information about all link flap detection settings will be displayed.
- If *port-string* is not specified, information for all ports will be displayed.

Mode

Switch mode, read-only.

Usage

The linkflap default conditions are shown in the following table.

Linkflap Parameter	Default Condition
Linkflap global state	Disabled
Linkflap port state	Disabled
Linkflap action	None
Linkflap interval	5
Linkflap maximum allowed link downs per 10 seconds	20
Linkflap threshold (number of allowed link down transitions before action is taken)	10

Examples

This example shows how to display the global status of the link trap detection function:

```
B2(rw)->show linkflap globalstate
Linkflap feature globally disabled
```

This example shows how to display ports disabled by link flap detection due to a violation:

```
B2(rw)->show linkflap downports
Ports currently held DOWN for Linkflap violations:
None.
```

This example shows how to display the link flap parameters table:

```
B2(rw)->show linkflap parameters
Linkflap Port Settable Parameter Table (X means error occurred)
Port      LF Status  Actions  Threshold   Interval    Downtime
--------  ---------  -------  ----------  ----------  ----------
fe.1.1    disabled   .......  10          5           300
fe.1.2    enabled    D..S..T  3           5           300
fe.1.3    disabled   ...S..T  10          5           300
```

Table 7-9 provides an explanation of the **show linkflap parameters** command output.

Table 7-9 show linkflap parameters Output Details

Output Field	What it displays...
Port	Port designation.
LF Status	Link flap enabled state.
Actions	Actions to be taken if the port violates allowed link flap behavior. D = disabled, S = Syslog entry will be generated, T= SNMP trap will be generated.
Threshold	Number of link down transitions necessary to trigger the link flap action.
Interval	Time interval (in seconds) for accumulating link down transitions.
Downtime	Interval (in seconds) port(s) will be held down after a link flap violation.

This example shows how to display the link flap metrics table:

```
B2(rw)->show linkflap metrics
Port      LinkStatus   CurrentCount  TotalCount  TimeElapsed  Violations
--------  -----------  ------------  ----------  -----------  -------------
fe.1.1    operational  0             0           241437       0
fe.1.2    disabled     4             15          147          5
fe.1.3    operational  3             3           241402       0
```

Table 7-10 provides an explanation of the **show linkflap metrics** command output.

Table 7-10 show linkflap metrics Output Details

Output Field	What it displays...
Port	Port designation.
LinkStatus	Link status according to the link flap function.
CurrentCount	Link down count accruing toward the link flap threshold.
TotalCount	Number of link downs since system start,

Table 7-10 show linkflap metrics Output Details (Continued)

Output Field	What it displays...
TimeElapsed	Time (in seconds) since the last link down event.
Violations	Number of link flap violations on listed ports since system start.

set linkflap globalstate

Use this command to globally enable or disable the link flap detection function.

Syntax

set linkflap globalstate {**disable** | **enable**}

Parameters

disable | **enable**	Globally disables or enables the link flap detection function.

Defaults

By default, the function is disabled globally and on all ports.

Mode

Switch mode, read-write.

Usage

By default, the function is disabled globally and on all ports. If disabled globally after per-port settings have been configured using the linkflap commands, per-port settings will be retained.

Example

This example shows how to globally enable the link trap detection function.

```
B2(rw)->set linkflap globalstate enable
```

set linkflap portstate

Use this command to enable or disable link flap monitoring on one or more ports.

Syntax

set linkflap portstate {**disable** | **enable**} [*port-string*]

Parameters

disable | **enable**	Disables or enables the link flap detection function.
port-string	(Optional) Specifies the port or ports on which to disable or enable monitoring.

Defaults

If *port-string* is not specified, all ports are enabled or disabled.

Mode

Switch command, read-write.

Example

This example shows how to enable the link trap monitoring on all ports.

```
B2(rw)->set linkflap portstate enable
```

set linkflap interval

Use this command to set the time interval (in seconds) for accumulating link down transitions.

Syntax

set linkflap interval *port-string interval-value*

Parameters

port-string	Specifies the port(s) on which to set the link flap interval.
interval-value	Specifies an interval in seconds. A value of 0 will set the interval to forever.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the link flap interval on port fe.1.4 to 1000 seconds.

```
B2(rw)->set linkflap interval fe.1.4 1000
```

set linkflap action

Use this command to set reactions to a link flap violation.

Syntax

set linkflap action *port-string* {**disableInterface** | **gensyslogentry** | **gentrap** | **all**}

Parameters

port-string	Specifies the port(s) on which to set the link flap action.
disableInterface	Sets the reaction as disabling the interface.
gensyslogentry	Sets the reaction as generating a syslog entry.
gentrap	Sets the reaction as generating an SNMP trap.
all	Sets the reaction as all of the above.

Defaults

None.

Mode

Switch mode, read-write.

Example

This example shows how to set the link flap violation action on port fe.1.4 to generating a Syslog entry.

```
B2(rw)->set linkflap action fe.1.4 gensyslogentry
```

clear linkflap action

Use this command to clear reactions to a link flap violation.

Syntax

clear linkflap action [*port-string*] {**disableInterface** | **gensyslogentry** | **gentrap** | **all**}

Parameters

port-string	(Optional) Specifies the port(s) on which to clear the link flap action.
disableInterface	Clears the reaction as disabling the interface.
gensyslogentry	Clears the reaction as generating a syslog entry.
gentrap	Clears the reaction as generating an SNMP trap.
all	Clears the reaction as all of the above.

Defaults

If *port-string* is not specified, actions will be cleared on all ports.

Mode

Switch mode, read-write.

Example

This example shows how to clear the link flap violation action on port fe.1.4 to generating a Syslog entry.

```
B2(rw)->clear linkflap action fe.1.4 gensyslogentry
```

set linkflap threshold

Use this command to set the link flap action trigger count.

Syntax

set linkflap threshold *port-string threshold-value*

Parameters

port-string	Specifies the port(s) on which to set the link flap action trigger count.
threshold-value	Specifies the number of link down transitions necessary to trigger the link flap action. A minimum of 1 must be configured.

Defaults

None.

Mode

Switch mode, read-write.

Example

This example shows how to set the link flap threshold on port fe.1.4 to 5.

```
B2(rw)->set linkflap threshold fe.1.4 5
```

set linkflap downtime

Use this command to set the time interval (in seconds) one or more ports will be held down after a link flap violation.

Syntax

`set linkflap downtime` *`port-string downtime-value`*

Parameters

port-string	Specifies the port(s) on which to set the link flap downtime.
downtime-value	Specifies a downtime in seconds. A value of 0 will set the downtime to forever.

Defaults

None.

Mode

Switch mode, read-write.

Example

This example shows how to set the link flap downtime on port fe.1.4 to 5000 seconds.

```
B2(rw)->set linkflap downtime fe.1.4 5000
```

clear linkflap down

Use this command to toggle link flap disabled ports to operational.

Syntax

`clear linkflap down` [*`port-string`*]

Parameters

port-string	(Optional) Specifies the ports to make operational.

Defaults

If *port-string* is not specified, all ports disabled by a link flap violation will be made operational.

Mode

Switch mode, read-write.

Example

This example shows how to make disabled port fe.1.4 operational.

```
B2(rw)->clear linkflap down fe.1.4
```

clear linkflap

Use this command to clear all link flap options and / or statistics on one or more ports.

Syntax

clear linkflap {**all** | **stats** [*port-string*] | **parameter** *port-string* {**threshold** | **interval** | **downtime** | **all**}

Parameters

all | **stats**	Clears all options and statistics, or clears only statistics.
parameter	Clears link flap parameters.
threshold | **interval** | **downtime** | **all**	Clears link flap threshold, interval, downtime or all parameters.
port-string	(Optional unless parameter is specified) Specifies the port(s) on which to clear settings.

Defaults

If *port-string* is not specified, settings and/or statistics will be cleared on all ports.

Mode

Switch mode, read-write.

Example

This example shows how to clear all link flap options on port fe.1.4.

```
B2(rw)->clear linkflap all fe.1.4
```

Configuring Broadcast Suppression

Purpose

To review and set the broadcast suppression threshold for one or more ports. This feature limits the number of received broadcast frames the switch will accept per port. Broadcast suppression thresholds apply only to broadcast traffic—multicast traffic is not affected. By default, a broadcast suppression threshold of 14881 packets per second (pps) will be used, regardless of actual port speed. Broadcast suppression protects against broadcast storms and ARP sweeps.

Commands

For information about...	Refer to page...
show port broadcast	7-30
set port broadcast	7-31
clear port broadcast	7-31

show port broadcast

Use this command to display port broadcast suppression thresholds.

Syntax

show port broadcast [*port-string*]

Parameters

port-string	(Optional) Select the ports for which to show broadcast suppression thresholds. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, broadcast status of all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the broadcast suppression thresholds for ports 1 through 4:

```
B2(su)->show port broadcast fe.1.1-4
Port          Total BC       Threshold
              Packets        (pkts/s)
---------------------------------------
fe.1.1        0               50
fe.1.2        0               50
fe.1.3        0               40
fe.1.4        0               14881
```

set port broadcast

Use this command to set the broadcast suppression threshold, in packets per second, on one or more ports. This sets a threshold on the broadcast traffic that is received and switched out to other ports.

Syntax

set port broadcast *port-string threshold-val*

Parameters

port-string	Select the ports for which to configure broadcast suppression thresholds. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
threshold-val	Sets the packets per second threshold on broadcast traffic. Maximum value is • 148810 for Fast Ethernet ports • 1488100 for 1-Gigabit ports. • 14881000 for 10- Gigabit ports

Defaults

None.

Mode

Switch command, read-write.

Usage

Per port broadcast suppression is hardset to be globally enabled on the B2. If you would like to disable broadcast suppression, you can get the same result by setting the threshold limit for each port to the maximum number of packets which can be received per second as listed in the parameters section, above. The default broadcast suppression threshold for all ports is set to 14881.

Example

This example configures ports 1 through 5 with a broadcast limit of 50 pps:

```
B2(su)->set port broadcast fe.1.1-5 50
```

clear port broadcast

Use this command to clear the broadcast threshold limit to the default value of 14881 for the selected port.

Syntax

clear port broadcast *port-string* **threshold**

Parameters

port-string	Select the ports for which to clear broadcast suppression thresholds. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears the broadcast threshold limit to 14881 pps for ports 1 through 5:

```
B2(su)->clear port broadcast fe.1.1-5 threshold
```

Port Mirroring

Caution: Port mirroring configuration should be performed only by personnel who are knowledgeable about the effects of port mirroring and its impact on network operation.

The SecureStack B2 device allows you to mirror (or redirect) the traffic being switched on a port for the purposes of network traffic analysis and connection assurance. When port mirroring is enabled, one port becomes a monitor port for another port within the device.

Mirroring Features

The SecureStack B2 device supports the following mirroring features:

- Mirroring can be configured in a many-to-one configuration so that one target (destination) port can monitor traffic on up to 8 source ports. Only one mirror destination port can be configured per stack, if applicable.
- Both transmit and receive traffic will be mirrored.
- A destination port will only act as a mirroring port when the session is operationally active.
- When a port mirror is created, the mirror destination port is removed from the egress list of VLAN 1 after a reboot.
- MAC addresses will be learned for packets tagged with the mirror VLAN ID. This will prevent the ability to snoop traffic across multiple hops.

Caution: Traffic mirrored to a VLAN may contain control traffic. This may be interpreted by the downstream neighbor as legal control frames. It is recommended that you disable any protocols (such as Spanning Tree) on inter-switch connections that might be affected .

Configuring SMON MIB Port Mirroring

Overview

SMON port mirroring support on Enterasys SecureStack B2, B3, C2 and C3 devices allows you to redirect traffic on ports remotely using SMON MIBs. This is useful for troubleshooting or problem solving when network management through the console port, telnet, or SSH is not feasible.

Procedures

Perform the following steps to configure and monitor port mirroring using SMON MIB objects.

To c reate and enable a port mirroring instance:

1. Open a MIB browser, such as Netsight MIB Tools
2. In the MIB directory tree, navigate to the **portCopyEntry** folder and expand it.
3. Select the **portCopyStatus** MIB.
4. Enter a desired source and target port in the **Instance** field using the format *source.target*.

   For example, 3.2 would create a relationship where source port fe.1.3 would be mirrored to target port fe.1.2.

Note: In order to configure a port mirroring relationship, both source and destination interfaces must be enabled and operational (up).

5. Enter MIB option **4** (createAndGo) and perform an SNMP **Set** operation.
6. (Optional) Use the CLI to verify the port mirroring instance has been created and enabled as shown in the following example:

```
B2(su)->show port mirroring
Port Mirroring
==============
Source Port     = fe.1.3
Target Port     = fe.1.2
Frames Mirrored = Rx and Tx
Port Mirroring status enabled
```

To create a port mirroring instance without automatically enabling it:

1. Complete steps 1-4 above.
2. Enter MIB option **5** (createAndWait) and perform an SNMP **Set** operation.
3. (Optional) Use the CLI to verify the port mirroring instance has been created set to disabled mode as shown in the following example:

```
B2(su)->show port mirroring
Port Mirroring
==============
Source Port     = fe.1.3
Target Port     = fe.1.2
Frames Mirrored = Rx and Tx
Port Mirroring status disabled
```

4. When you are ready to enable this instance, enter MIB option **1** (active) and perform an SNMP **Set** operation.
5. (Optional) Use the CLI to verify the port mirroring instance has been enabled.

To delete a port mirroring instance:

1. Select a previously created port mirroring instance in your MIB browser.
2. Enter MIB option **6** (destroy) and perform an SNMP **Set** operation.
3. (Optional) Use the CLI to verify the port mirroring instance has been deleted as shown in the following example:

```
B2(su)->show port mirroring
No Port Mirrors configured.
```

Purpose

To review and configure port mirroring on the device.

Commands

For information about...	Refer to page...
show port mirroring	7-35
set port mirroring	7-35
clear port mirroring	7-36

show port mirroring

Use this command to display the source and target ports for mirroring, and whether mirroring is currently enabled or disabled for those ports.

Syntax

show port mirroring

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display port mirroring information. In this case, fe.1.4 is configured as a source port and fe.1.11 is a target and mirroring has been enabled between these ports:

```
B2(su)->show port mirroring

Port Mirroring
==============
 Source Port = fe.1.4
 Target Port = fe.1.11
 Frames Mirrored = Rx and Tx
 Port Mirroring status enabled.
```

set port mirroring

Use this command to create a new mirroring relationship or to enable or disable an existing mirroring relationship between two ports.

Notes: When a port mirror is created, the mirror destination port is removed from VLAN 1's egress list after a reboot.
"MAC addresses will be learned for packets tagged with the mirror VLAN ID. This will prevent the ability to snoop traffic across multiple hops.

Syntax

set port mirroring {**create** | **disable** | **enable**} *source destination*}

Parameters

create | **disable** | **enable**	Creates, disables or enables mirroring settings on the specified ports.
source	Specifies the source port designation. This is the port on which the traffic will be monitored. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
destination	Specifies the target port designation. This is the port that will duplicate or "mirror" all the traffic on the monitored port. Only one destination port can be configured per stack, if applicable. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Usage

Note that LAG ports and their underlying physical ports, as described in "Link Aggregation Control Protocol (LACP)" on page 7-38, cannot be mirrored.

Example

This example shows how to create and enable port mirroring with fe.1.4 as the source port, and fe.1.11 as the target port:

```
B2(su)->set port mirroring create fe.1.4 fe.1.11
B2(su)->set port mirroring enable fe.1.4 fe.1.11
```

clear port mirroring

Use this command to clear a port mirroring relationship.

Syntax

`clear port mirroring` *`source destination`*

Parameters

source	Specifies the source port of the mirroring configuration to be cleared. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
destination	Specifies the target port of the mirroring configuration to be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear port mirroring between source port fe.1.4 and target port fe.1.11:

```
B2(su)->clear port mirroring fe.1.4 fe.1.11
```

Link Aggregation Control Protocol (LACP)

Caution: Link aggregation configuration should only be performed by personnel who are knowledgeable about Spanning Tree and Link Aggregation, and fully understand the ramifications of modifications beyond device defaults. Otherwise, the proper operation of the network could be at risk.

Using multiple links simultaneously to increase bandwidth is a desirable switch feature, which can be accomplished if both sides agree on a set of ports that are being used as a Link Aggregation Group (LAG). Once a LAG is formed from selected ports, problems with looping can be avoided since the Spanning Tree can treat this LAG as a single port.

Enabled by default, the Link Aggregation Control Protocol (LACP) logically groups interfaces together to create a greater bandwidth uplink, or link aggregation, according to the IEEE 802.3ad standard. This standard allows the switch to determine which ports are in LAGs and configure them dynamically. Since the protocol is based on the IEEE 802.3ad specification, any switch from any vendor that supports this standard can aggregate links automatically.

802.3ad LACP aggregations can also be run to end-users (that is, a server) or to a router.

Note: Earlier (proprietary) implementations of port aggregation referred to groups of aggregated ports as “trunks”.

LACP Operation

For each aggregatable port in the device, LACP:

- Maintains configuration information (reflecting the inherent properties of the individual links as well as those established by management) to control aggregation.
- Exchanges configuration information with other devices to allocate the link to a Link Aggregation Group (LAG).

Note: A given link is allocated to, at most, one Link Aggregation Group (LAG) at a time. The allocation mechanism attempts to maximize aggregation, subject to management controls.

- Attaches the port to the aggregator used by the LAG, and detaches the port from the aggregator when it is no longer used by the LAG.
- Uses information from the partner device’s link aggregation control entity to decide whether to aggregate ports.

The operation of LACP involves the following activities:

- Checking that candidate links can actually be aggregated.
- Controlling the addition of a link to a LAG, and the creation of the group if necessary.
- Monitoring the status of aggregated links to ensure that the aggregation is still valid.
- Removing a link from a LAG if its membership is no longer valid, and removing the group if it no longer has any member links.

In order to allow LACP to determine whether a set of links connect to the same device, and to determine whether those links are compatible from the point of view of aggregation, it is necessary to be able to establish

- A globally unique identifier for each device that participates in link aggregation.

- A means of identifying the set of capabilities associated with each port and with each aggregator, as understood by a given device.
- A means of identifying a LAG and its associated aggregator.

Note: The path cost of a LAG port will be displayed as zero when it is not an active link.

LACP Terminology

Table 7-11 defines key terminology used in LACP configuration.

Table 7-11 LACP Terms and Definitions

Term	Definition
Aggregator	Virtual port that controls link aggregation for underlying physical ports. Each SecureStack B2 module provides 6 aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.6**.
LAG	Link Aggregation Group. Once underlying physical ports (for example, fe**.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one LAG with a **lag.x.x** port designation. SecureStack B2 LAGs can have up to 8 associated physical ports.
LACPDU	Link Aggregation Control Protocol Data Unit. The protocol exchanges aggregation state/mode information by way of a port's actor and partner operational states. LACPDUs sent by the first party (the actor) convey to the second party (the actor's protocol partner) what the actor knows, both about its own state and that of its partner.
Actor and Partner	An actor is the local device sending LACPDUs. Its protocol partner is the device on the other end of the link aggregation. Each maintains current status of the other via LACPDUs containing information about their ports' LACP status and operational state.
Admin Key	Value assigned to aggregator ports and physical ports that are candidates for joining a LAG. The LACP implementation on SecureStack B2 devices will use this value to form an oper key and will determine which underlying physical ports are capable of aggregating by comparing oper keys. Aggregator ports allow only underlying ports with oper keys matching theirs to join their LAG. On SecureStack B2 devices, the default admin key value is 32768.
System Priority	Value used to build a LAG ID, which determines aggregation precedence. If there are two partner devices competing for the same aggregator, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and will be allowed to use the aggregator. **Note:** Only one LACP system priority can be set on a SecureStack B2 device, using either the **set lacp asyspri** command (page 7-43), or the **set port lacp** command (page 7-48).

SecureStack B2 Usage Considerations

In normal usage (and typical implementations) there is no need to modify any of the default LACP parameters on the switch. The default values will result in the maximum number of aggregations possible. If the switch is placed in a configuration with its peers not running the protocol, no dynamic link aggregations will be formed and the switch will function normally (that

is, will block redundant paths). For information about building static aggregations, refer to **set lacp static** (page 7-44).

Each SecureStack B2 module provides six virtual link aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.6**. Each LAG can have up to eight associated physical ports. Once underlying physical ports (for example, **fe.x.x**, or **ge.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one LAG with a **lag.0.x** port designation. LACP determines which underlying physical ports are capable of aggregating by comparing operational keys. Aggregator ports allow only underlying ports with keys matching theirs to join their LAG.

LACP uses a system priority value to build a LAG ID, which determines aggregation precedence. If there are two partner devices competing for the same aggregator, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and will be allowed to use the aggregator.

There are a few cases in which ports will not aggregate:

- An underlying physical port is attached to another port on this same switch (loopback).
- There is no available aggregator for two or more ports with the same LAG ID. This can happen if there are simply no available aggregators, or if none of the aggregators have a matching admin key and system priority.
- 802.1x authentication is enabled using the **set eapol** command (page 19-19) and ports that would otherwise aggregate are not 802.1X authorized.

The LACP implementation on the SecureStack B2 device will allow up to eight physical ports into a LAG. The device with the lowest LAG ID determines which underlying physical ports are allowed into a LAG based on the ports' LAG port priority. Ports with the lowest LAG port priority values are allowed into the LAG and all other speed groupings go into a standby state.

Multi-port LAGs will continue to operate as long as there is at least one active port in the LAG. Therefore, there is no need to create backup single port LAGs or to specifically assign the LAG and all its physical ports to the egress list of the LAG's VLAN.

Typically, two or more ports are required to form a LAG. However, you can enable the creation of single port LAGs as described in "set lacp singleportlag" on page 7-46. If a single port LAG goes down and the switch stays up, the switch will reconfigure the LAG to the same LAG number if the port comes back up.

Note: To aggregate, underlying physical ports must be running in full duplex mode and must be of the same operating speed.

Commands

For information about...	Refer to page...
show lacp	7-41
set lacp	7-42
set lacp asyspri	7-43
set lacp aadminkey	7-43
clear lacp	7-44
set lacp static	7-44
clear lacp static	7-45

For information about...	Refer to page...
set lacp singleportlag	7-46
clear lacp singleportlag	7-45
show port lacp	7-47
set port lacp	7-48
clear port lacp	7-50

show lacp

Use this command to display information about one or more aggregator ports.

Syntax

show lacp [*port-string*]

Parameters

port-string	(Optional) Displays LACP information for specific LAG port(s). Valid port designations are lag.0.1 - 6.

Defaults

If *port-string* is not specified, link aggregation information for all LAGs will be displayed.

Mode

Switch command, read-only.

Usage

Each SecureStack B2 module provides 6 virtual link aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.6**. Once underlying physical ports (that is, **fe.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one Link Aggregation Group (LAG) with a **lag.x.x** port designation.

Example

This example shows how to display lacp information for lag.0.1. The following table describes the output fields.

```
B2(su)->show lacp lag.0.1
Global Link Aggregation state: enabled
Single Port LAGs:              disabled

Aggregator: lag.0.1
                         Actor                  Partner
System Identifier:     00:01:F4:5F:1E:20    00:11:88:11:74:F9
  System Priority:                 32768                32768
        Admin Key:                 32768
         Oper Key:                 32768                    0
   Attached Ports:    fe.1.1
                      fe.1.3
```

Table 7-12 provides an explanation of the command output.

Table 7-12 show lacp Output Details

Output Field	What It Displays...
Global Link Aggregation state	Shows if LACP is enabled or disabled on the switch.
Single Port LAGs	Displays if the single port LAG feature has been enabled on the switch. See "set lacp singleportlag" on page 7-46 for more about single port LAG.
Aggregator	LAG port designation. Each SecureStack B2 module provides 6 virtual link aggregator ports, which are designated in the CLI as **lag.0.1** through **lag.0.6**. Once underlying physical ports (for example, fe**.x.x**) are associated with an aggregator port, the resulting Link Aggregation Group (LAG) is represented with a **lag.x.x** port designation.
Actor	Local device participating in LACP negotiation.
Partner	Remote device participating in LACP negotiation.
System Identifier	MAC addresses for actor and partner.
System Priority	System priority value which determines aggregation precedence. Only one LACP system priority can be set on a SecureStack B2 device, using either the **set lacp asyspri** command (page 7-43), or the **set port lacp** command (page 7-48).
Admin Key	Port's assigned key. SecureStack B2 devices provide a default admin key value of 32768 for all LAG ports (lag.0.1 though lag.0.6).
Oper Key	Port's operational key, derived from the admin key. Only underlying physical ports with oper keys matching the aggregator's will be allowed to aggregate.
Attached Ports	Underlying physical ports associated with this aggregator.

set lacp

Use this command to disable or enable the Link Aggregation Control Protocol (LACP) on the device.

Syntax

```
set lacp {disable | enable}
```

Parameters

disable | **enable**	Disables or enables LACP.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to disable LACP:

```
B2(su)->set lacp disable
```

set lacp asyspri

Use this command to set the LACP system priority.

Syntax

set lacp asyspri *value*

Parameters

asyspri	Sets the system priority to be used in creating a LAG (Link Aggregation Group) ID. Valid values are **0** to **65535**.
value	Specifies a system priority value. Valid values are **0** to **65535**, with precedence given to lower values.

Defaults

None.

Mode

Switch command, read-write.

Usage

LACP uses this value to determine aggregation precedence. If there are two partner devices competing for the same aggregator, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and will be allowed to use the aggregator.

Example

This example shows how to set the LACP system priority to 1000:

```
B2(su)->set lacp asyspri 1000
```

set lacp aadminkey

Use this command to set the administratively assigned key for one or more aggregator ports.

Syntax

set lacp aadminkey *port-string value*

Parameters

port-string	Specifies the LAG port(s) on which to assign an admin key.
value	Specifies an admin key value to set. Valid values are **0** to **65535**. The default admin key value is 32768.

Defaults

None.

Mode

Switch command, read-write.

Usage

LACP will use this value to form an oper key. Only underlying physical ports with oper keys matching those of their aggregators will be allowed to aggregate. The default admin key value for all LAG ports is 32768.

Example

This example shows how to set the LACP admin key to 2000 for LAG port 6:

```
B2(su)->set lacp aadminkey lag.0.6 2000
```

clear lacp

Use this command to clear LACP system priority or admin key settings.

Syntax

clear lacp {[**asyspri**] [**aadminkey** *port-string*]}

Parameters

asyspri	Clears system priority.
aadminkey *port-string*	Resets admin keys for one or more ports to the default value of 32768.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the actor admin key for LAG port 6:

```
B2(su)->clear lacp aadminkey lag.0.6
```

set lacp static

Use this command to disable or enable static link aggregation, or to assign one or more underlying physical ports to a Link Aggregation Group (LAG).

Syntax

set lacp static {disable | enable} | *lagportstring* [*key*] *port-string*

Parameters

disable | **enable**	Disables or enables static link aggregation.
lagportstring	Specifies the LAG aggregator port to which new ports will be assigned.

key	(Optional) Specifies the new member port and LAG port aggregator admin key value. Only ports with matching keys are allowed to aggregate. Valid values are **0** - **65535**. **Note:** This key value must be unique. If ports other than the desired underlying physical ports share the same admin key value, aggregation will fail or undesired aggregations will form.
port-string	Specifies the member port(s) to add to the LAG. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If not specified, a *key* will be assigned according to the specified aggregator. For example a key of 4 would be assigned to lag.0.4.

Mode

Switch command, read-write.

Example

This example shows how to add port fe.1.6 to the LAG of aggregator port 6:

```
B2(su)->set lacp static lag.0.6 fe.1.6
```

clear lacp static

Use this command to remove specific ports from a Link Aggregation Group.

Syntax

`clear lacp static` *`lagportstring port-string`*

Parameters

lagportstring	Specifies the LAG aggregator port from which ports will be removed.
port-string	Specifies the port(s) to remove from the LAG. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to remove fe.1.6 from the LAG of aggregator port 6:

```
B2(su)->clear lacp static lag.0.6 fe.1.6
```

set lacp singleportlag

Use this command to enable or disable the formation of single port LAGs.

Syntax

```
set lacp singleportlag {enable | disable}
```

Parameters

disable | **enable**	Enables or disables the formation of single port LAGs.

Defaults

None.

Mode

Switch command, read-write.

Usage

When single port LAGs are enabled, Link Aggregration Groups can be formed when only one port is receiving protocol transmissions from a partner. When this setting is disabled, two or more ports are required to form a LAG.

This setting has no effect on existing LAGs created with multiple member ports. It also does not prevent previously formed LAGs from coming up after they have gone down, as long as any previous LAG member ports come up connected to the same switch as before the LAG went down.

Example

This example enables the formation of single port LAGs:

```
B2(su)->set lacp singleportlag enable
```

clear lacp singleportlag

Use this command to reset the single port LAG function back to the default state of disabled.

Syntax

```
clear lacp singleportlag
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the single port LAG function back to disabled:

```
B2(su)->clear lacp singleportlag
```

show port lacp

Use this command to display link aggregation information for one or more underlying physical ports.

Syntax

show port lacp port *port-string* {[**status {detail | summary}**] | [**counters**]}

Parameters

port *port-string*	Displays LACP information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
status detail | **summary**	Displays LACP status in detailed or summary information.
counters	Displays LACP counter information.

Defaults

None.

Mode

Switch command, read-only.

Usage

State definitions, such as ActorAdminState and Partner AdminState, are indicated with letter abbreviations. If the **show port lacp** command displays one or more of the following letters, it means the state is true for the associated actor or partner ports:

- **E** = Expired
- **F** = Defaulted
- **D** = Distributing (tx enabled)
- **C** = Collecting (rx enabled)
- **S** = Synchronized (actor and partner agree)
- **G** = Aggregation allowed
- **S/l** = Short/Long LACP timeout
- **A/p** = Active/Passive LACP

For more information about these states, refer to **set port lacp** (page 7-48) and the IEEE 802.3 2002 specification.

Examples

This example shows how to display detailed LACP status information for port fe.1.12:

```
B2(su)-> show port lacp port fe.1.12 status detail
```

```
Port Instance:                fe.1.12
ActorPort:                      1411  PartnerAdminPort:                    1411
ActorSystemPriority:           32768  PartnerOperPort:                     1411
ActorPortPriority:             32768  PartnerAdminSystemPriority:         32768
ActorAdminKey:                 32768  PartnerOperSystemPriority:          32768
ActorOperKey:                  32768  PartnerAdminPortPriority:           32768
ActorAdminState:           -----GlA   PartnerOperPortPriority:            32768
ActorOperState:            -F----lA   PartnerAdminKey:                     1411
ActorSystemID:    00-e0-63-9d-b5-87   PartnerOperKey:                     1411
SelectedAggID:                 none   PartnerAdminState:               --DCSGlp
AttachedAggID:                 none   PartnerOperState:                --DC-Glp
MuxState:                  Detached   PartnerAdminSystemID:   00-00-00-00-00-00
DebugRxState:         port Disabled   PartnerOperSystemID:    00-00-00-00-00-00
```

This example shows how to display summarized LACP status information for port fe.1.12:

```
B2(su)->show port lacp port fe.1.12 status summary
Port     Aggr        Actor System           Partner System
                Pri:   System ID:  Key:    Pri: System ID:     Key:
fe.1.12    none [(32768,00e0639db587,32768),(32768,000000000000, 1411)]
```

This example shows how to display LACP counters for port fe.1.12:

```
B2(su)->show port lacp port fe.1.12 counters
Port Instance:                      fe.1.12
LACPDUsRx:                          11067
LACPDUsTx:                              0
IllegalRx:                              0
UnknownRx:                              0
MarkerPDUsRx:                           0
MarkerPDUsTx:                           0
MarkerResponsePDUsRx:                   0
MarkerResponsePDUsTx:                 374
```

set port lacp

Use this command to set link aggregation parameters for one or more ports. These settings will determine the specified underlying physical ports' ability to join a LAG, and their administrative state once aggregated.

Syntax

set port lacp port *port-string* {[**aadminkey** *aadminkey*] [**adminstate** {**lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**}] [**aportpri** *aportpri*] [**asyspri** *asyspri*] [**enable** | [**disable**] [**padminkey** *padminkey*] [**padminport** *padminport*] [**padminportpri** *padminportpri*] [**padminstate** {**lacpactive** | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**}] [**padminsysid** *padminsysid*] [**padminsyspri** *padminsyspri*]

Parameters

port *port-string*	Specifies the physical port(s) on which to configure LACP. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
aadminkey *aadminkey*	Sets the port's actor admin key. LACP will use this value to form an oper key and will determine which underlying physical ports are capable of aggregating by comparing oper keys. Aggregator ports allow only underlying ports with oper keys matching theirs to join their LAG. Valid values are **1** - **65535**. The default key value is 32768.

aadminstate lacpactive | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**	Sets the port's actor LACP administrative state to allow for: **lacpactive** - Transmitting LACP PDUs. **lacptimeout** - Transmitting LACP PDUs every 1 sec. vs 30 sec. (default). **lacpagg** - Aggregation on this port. **lacpsync** - Transition to synchronization state. **lacpcollect** - Transition to collection state. **lacpdist** - Transition to distribution state. **lacpdef** - Transition to defaulted state. **lacpexpire** - Transition to expired state.
aportpri *aportpri*	Sets the port's actor port priority. Valid values are **0** - **65535**, with lower values designating higher priority.
asyspri *asyspri*	Sets the port's actor system priority. The LACP implementation on the SecureStack B2 device uses this value to determine aggregation precedence when there are two devices competing for the same aggregator. Valid values are **0** - **65535**, with higher precedence given to lower values. **Note:** Only one LACP system priority can be set on a SecureStack B2 device, using either this command, or the **set lacp asyspri** command ("set lacp asyspri" on page 7-43).
enable	(Optional) Enables LACPDU processing on this port.
disable	(Optional) Disables LACPDU processing on this port.
padminkey *padminkey*	Sets a default value to use as the port's partner admin key. Only ports with matching admin keys are allowed to aggregate. Valid values are **1** - **65535**.
padminport *padminport*	Sets a default value to use as the port's partner admin value. Valid values are **1** - **65535.**
padminportpri *padminportpri*	Sets a default value to use as the port's partner port priority. Valid values are **0** - **65535**, with lower values given higher priority.
padminstate lacpactive | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire**	Sets a port's partner LACP administrative state. See **aadminstate** for valid options.
padminsysid *padminsysid*	Sets a default value to use as the port's partner system ID. This is a MAC address.
padminsyspri *padminsyspri*	Sets a default value to use as the port's partner priority. Valid values are **0** - **65535**, with lower values given higher priority.

Defaults

At least one parameter must be entered per *port-string*.

If **enable** or **disable** are not specified, port(s) will be enabled with the LACP parameters entered.

Mode

Switch command, read-write.

Usage

LACP commands and parameters beginning with an "a" (such as **aadminkey**) set actor values. Corresponding commands and parameters beginning with a "p" (such as **padminkey**) set corresponding partner values. Actor refers to the local device participating in LACP negotiation, while partner refers to its remote device partner at the other end of the negotiation. Actors and partners maintain current status of the other via LACPDUs containing information about their ports' LACP status and operational state.

Example

This example shows how to set the actor admin key to 3555 for port `fe.3.16`:

```
B2(su)->set port lacp fe.3.16 aadminkey 3555
```

clear port lacp

Use this command to clear link aggregation settings for one or more ports.

Syntax

```
clear port lacp port port-string {[aadminkey] [aportpri] [asyspri] [aadminstate
{lacpactive | lacptimeout | lacpagg | lacpsync | lacpcollect | lacpdist | lacpdef
| lacpexpire | all}] [padminsyspri] [padminsysid] [padminkey] [padminportpri]
[padminport] [padminstate {lacpactive | lacptimeout | lacpagg | lacpsync |
lacpcollect | lacpdist | lacpdef | lacpexpire | all}]}
```

Parameters

port *port-string*	Specifies the physical port(s) on which LACP settings will be cleared. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
aadminkey	Clears a port's actor admin key.
aportpri	Clears a port's actor port priority.
asyspri	Clears the port's actor system priority.
aadminstate lacpactive | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire** | **all**	Clears a port's specific actor admin state, or all actor admin state(s). For descriptions of specific states, refer to the **set port lacp** command ("set port lacp" on page 7-48).
padminsyspri	Clears the port's default partner priority value.
padminsysid	Clears the port's default partner system ID.
padminkey	Clears the port's default partner admin key.
padminportpri	Clears the port's default partner port priority.

padminport	Deletes a partner port from the LACP configuration.
padminstate lacpactive | **lacptimeout** | **lacpagg** | **lacpsync** | **lacpcollect** | **lacpdist** | **lacpdef** | **lacpexpire** | **all**	Clears the port's specific partner admin state, or all partner admin state(s).

Defaults

None.

Mode

Switch command, read-write.

Usage

If you set a port to LACP passive using the command **clear port lacp port** <*port-string*> **aadminstate lacpactive**, the command **clear port lacp port** <*port-string*> **aadminstate lacptimeout** will also be added to the configuration. If you unset the first command, it will remove the second command automatically from the configuration file.

Example

This example shows how to clear all link aggregation parameters for port `fe.3.16`:

```
B2(su)->clear port lacp port fe.3.16
```

Configuring Protected Ports

The Protected Port feature is used to prevent ports from forwarding traffic to each other, even when they are on the same VLAN. Ports may be designated as either protected or unprotected. Ports are unprotected by default. Multiple groups of protected ports are supported.

Protected Port Operation

Ports that are configured to be protected cannot forward traffic to other protected ports in the same group, regardless of having the same VLAN membership. However, protected ports can forward traffic to ports which are unprotected (not listed in any group). Protected ports can also forward traffic to protected ports in a different group, if they are in the same VLAN. Unprotected ports can forward traffic to both protected and unprotected ports. A port may belong to only one group of protected ports.

This feature only applies to ports within a switch or a stack. It does not apply across multiple switches in a network.

Commands

For information about...	Refer to page...
set port protected	7-52
show port protected	7-53
clear port protected	7-53
set port protected name	7-54
show port protected name	7-54
clear port protected name	7-55

set port protected

Use this command to specify a port to be protected and assign the port to a group of protected ports. A port can be assigned to only one group.

Syntax

`set port protected` *`port-string group-id`*

Parameters

port-string	Specifies the port or ports to be protected.
group-id	Specifies the id of the group to which the ports should be assigned. Id can range from 0 to 2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to assign ports fe.1.1 through fe.1.3 to protected port group 1:

```
B2(rw)->set port protected fe.1.1-3 1
```

show port protected

Use this command to display information about the ports configured for protected mode.

Syntax

show port protected [*port-string*] | [*group-id*]

Parameters

port-string	(Optional) Specifies the port or ports for which to display information.
group-id	(Optional) Specifies the id of the group for which to display information. Id can range from 0 to 2.

Defaults

If no parameters are entered, information about all protected ports is displayed.

Mode

Read-only.

Example

This example shows how to display information about all protected ports:

```
B2(ro)->show port protected
Group id      Port
----------------------
1             fe.1.1
1             fe.1.2
1             fe.1.3
```

clear port protected

Use this command to remove a port or group from protected mode.

Syntax

clear port protected [*port-string*] | [*group-id*]

Parameters

port-string	(Optional) Specifies the port or ports to remove from protected mode.
group-id	(Optional) Specifies the id of the group to remove from protected mode. Id can range from 0 to 2.

Defaults

If no parameters are entered, all protected ports and groups are cleared.

Mode

Switch command, read-write.

Example

This example shows how to clear protected ports fe.1.1 through fe.1.3:

```
B2(rw)->clear port protected fe.1.1-3
```

set port protected name

Use this command to assign a name to a protected port group id.

Syntax

set port protected name *group-id name*

Parameters

group-id	Specifies the id of this group. Id can range from 0 to 2.
name	Specifies a name for the group. The name can be up to 32 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to assign the name “group1” to protected port group 1:

```
B2(rw)->set port protected name 1 group1
```

show port protected name

Use this command to display the name for the group ids specified.

Syntax

show port protected name *group-id*

Parameters

group-id	Specifies the id of the group to display. Id can range from 0 to 2.

Defaults

None.

Mode

Read-only.

Example

This example shows how to show the name of protected port group 1:

```
B2(ro)->show port protected name 1
Group ID       Group Name
----------------------------
1              group1
```

clear port protected name

Use this command to clear the name of a protected group.

Syntax

clear port protected name *group-id*

Parameters

group-id	Specifies the id of the group for which to clear the name. Id can range from 0 to 2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the name of protected port group 1:

```
B2(rw)->clear port protected name 1
```

8

SNMP Configuration

This chapter describes the Simple Network Management Protocol (SNMP) set of commands and how to use them.

For information about...	Refer to page...
SNMP Configuration Summary	8-1
Reviewing SNMP Statistics	8-3
Configuring SNMP Users, Groups, and Communities	8-8
Configuring SNMP Access Rights	8-15
Configuring SNMP MIB Views	8-19
Configuring SNMP Target Parameters	8-22
Configuring SNMP Target Addresses	8-25
Configuring SNMP Notification Parameters	8-28
Creating a Basic SNMP Trap Configuration	8-37

SNMP Configuration Summary

SNMP is an application-layer protocol that facilitates the exchange of management information between network devices. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

SecureStack B2 devices support three versions of SNMP:

- Version 1 (SNMPv1) — This is the initial implementation of SNMP. Refer to RFC 1157 for a full description of functionality.
- Version 2 (SNMPv2c) — The second release of SNMP, described in RFC 1907, has additions and enhancements to data types, counter size, and protocol operations.
- Version 3 (SNMPv3) — This is the most recent version of SNMP, and includes significant enhancements to administration and security. SNMPv3 is fully described in RFC 2571, RFC 2572, RFC 2573, RFC 2574, and RFC 2575.

SNMPv1 and SNMPv2c

The components of SNMPv1 and SNMPv2c network management fall into three categories:

- Managed devices (such as a switch).
- SNMP agents and MIBs, including SNMP traps, community strings, and Remote Monitoring (RMON) MIBs, which run on managed devices.

- SNMP network management applications, such as the Enterasys NetSight application, which communicate with agents to get statistics and alerts from the managed devices.

SNMPv3

SNMPv3 is an interoperable standards-based protocol that provides secure access to devices by authenticating and encrypting frames over the network. The advanced security features provided in SNMPv3 are as follows:

- Message integrity — Collects data securely without being tampered with or corrupted.
- Authentication — Determines the message is from a valid source.
- Encryption — Scrambles the contents of a frame to prevent it from being seen by an unauthorized source.

Unlike SNMPv1 and SNMPv2c, in SNMPv3, the concept of SNMP agents and SNMP managers no longer apply. These concepts have been combined into an SNMP entity. An SNMP entity consists of an SNMP engine and SNMP applications. An SNMP engine consists of the following four components:

- Dispatcher — This component sends and receives messages.
- Message processing subsystem — This component accepts outgoing PDUs from the dispatcher and prepares them for transmission by wrapping them in a message header and returning them to the dispatcher. The message processing subsystem also accepts incoming messages from the dispatcher, processes each message header, and returns the enclosed PDU to the dispatcher.
- Security subsystem — This component authenticates and encrypts messages.
- Access control subsystem — This component determines which users and which operations are allowed access to managed objects.

About SNMP Security Models and Levels

An SNMP security model is an authentication strategy that is set up for a user and the group in which the user resides. A security level is the permitted level of security within a security model. The three levels of SNMP security are: No authentication required (NoAuthNoPriv); authentication required (AuthNoPriv); and privacy (authPriv). A combination of a security model and a security level determines which security mechanism is employed when handling an SNMP frame. Table 8-13 identifies the levels of SNMP security available on SecureStack B2 devices and authentication required within each model.

Table 8-13 SNMP Security Levels

Model	Security Level	Authentication	Encryption	How It Works
v1	NoAuthNoPriv	Community string	None	Uses a community string match for authentication.
v2c	NoAuthNoPriv	Community string	None	Uses a community string match for authentication.

Table 8-13 SNMP Security Levels (Continued)

Model	Security Level	Authentication	Encryption	How It Works
v3	NoAuthNoPriv	User name	None	Uses a user name match for authentication.
	AuthNoPriv	MD5 or SHA	None	Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms.
	authPriv	MD5 or SHA	DES	Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms. Provides DES 56-bit encryption in addition to authentication based on the CBC-DES (DES-56) standard.

Using SNMP Contexts to Access Specific MIBs

By default, when operating from the switch CLI, SecureStack B2 devices allow access to all SNMP MIBs or contexts. A context is a collection of MIB objects, often associated with a particular physical or logical device.

If no optional *context* parameters are configured for v1 and v2 "community" names and v3 "user" groups, these groups are able to access all SNMP MIB objects when in switch mode.

Specifying a *context* parameter when setting up SNMP user group would permit or restrict the group's switch management access to the MIB(s) specified by the *context* (MIB object ID) value.

All SNMP contexts known to the device can be displayed using the **show snmp context** command as described in "show snmp context" on page 8-20.

Example

This example permits the "powergroup" to manage all MIBs via SNMPv3:

```
B2(su)->set snmp access powergroup security-model usm
```

Configuration Considerations

Commands for configuring SNMP on the SecureStack B2 device are independent during the SNMP setup process. For instance, target parameters can be specified when setting up optional notification filters — even though these parameters have not yet been created with the **set snmp targetparams** command.

Reviewing SNMP Statistics

Purpose

To review SNMP statistics.

Commands

For information about...	Refer to page...
show snmp engineid	8-4
show snmp counters	8-5

show snmp engineid

Use this command to display the SNMP local engine ID. This is the SNMP v3 engine's administratively unique identifier.

Syntax

`show snmp engineid`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP engine properties:

```
B2(su)->show snmp engineid
EngineId: 80:00:15:f8:03:00:e0:63:9d:b5:87
Engine Boots    = 12
Engine Time     = 162181
Max Msg Size    = 2048
```

Table 8-14 provides an explanation of the command output.

Table 8-14 show snmp engineid Output Details

Output Field	What It Displays...
EngineId	String identifying the SNMP agent on the device.
Engine Boots	Number of times the SNMP engine has been started or reinitialized.
Engine Time	Time in seconds since last reboot.
Max Msg Size	Maximum accepted length, in bytes, of SNMP frame.

show snmp counters

Use this command to display SNMP traffic counter values.

Syntax

show snmp counters

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP counter values

```
B2(su)->show snmp counters

--- mib2 SNMP group counters:
snmpInPkts              = 396601
snmpOutPkts             = 396601
snmpInBadVersions       = 0
snmpInBadCommunityNames = 0
snmpInBadCommunityUses  = 0
snmpInASNParseErrs      = 0
snmpInTooBigs           = 0
snmpInNoSuchNames       = 0
snmpInBadValues         = 0
snmpInReadOnlys         = 0
snmpInGenErrs           = 0
snmpInTotalReqVars      = 403661
snmpInTotalSetVars      = 534
snmpInGetRequests       = 290
snmpInGetNexts          = 396279
snmpInSetRequests       = 32
snmpInGetResponses      = 0
snmpInTraps             = 0
snmpOutTooBigs          = 0
snmpOutNoSuchNames      = 11
snmpOutBadValues        = 0
snmpOutGenErrs          = 0
snmpOutGetRequests      = 0
snmpOutGetNexts         = 0
snmpOutSetRequests      = 0
snmpOutGetResponses     = 396601
snmpOutTraps            = 0
snmpSilentDrops         = 0
snmpProxyDrops          = 0

--- USM Stats counters:
usmStatsUnsupportedSecLevels = 0
usmStatsNotInTimeWindows     = 0
usmStatsUnknownUserNames     = 0
```

```
usmStatsUnknownEngineIDs     = 0
usmStatsWrongDigests         = 0
usmStatsDecryptionErrors     = 0
```

Table 8-15 provides an explanation of the command output.

Table 8-15 show snmp counters Output Details

Output Field	What It Displays...
snmpInPkts	Number of messages delivered to the SNMP entity from the transport service.
snmpOutPkts	Number of SNMP messages passed from the SNMP protocol entity to the transport service.
snmpInBadVersions	Number of SNMP messages delivered to the SNMP entity for an unsupported SNMP version.
snmpInBadCommunityNames	Number of SNMP messages delivered to the SNMP entity that used an SNMP community name not known to the entity.
snmpInBadCommunityUses	Number of SNMP messages delivered to the SNMP entity that represented an SNMP operation not allowed by the SNMP community named in the message.
snmpInASNParseErrs	Number of ASN.1 (Abstract Syntax Notation) or BER (Basic Encoding Rules) errors encountered by the SNMP entity when decoding received SNMP messages.
snmpInTooBigs	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “tooBig.”
snmpInNoSuchNames	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “noSuchName.”
snmpInBadValues	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as “badValue.”
snmpInReadOnlys	Number of valid SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as "readOnly."
snmpInGenErrs	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as "genErr."
snmpInTotalReqVars	Number of MIB objects retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.
snmpInTotalSetVars	Number of MIB objects altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.
snmpInGetRequests	Number of SNMP Get-Request PDUs accepted and processed by the SNMP protocol entity.
snmpInGetNexts	Number of SNMP Get-Next PDUs accepted and processed by the SNMP protocol entity.
snmpInSetRequests	Number of SNMP Set-Request PDUs accepted and processed by the SNMP protocol entity.
snmpInGetResponses	Number of SNMP Get-Response PDUs accepted and processed by the SNMP protocol entity.
snmpInTraps	Number of SNMP Trap PDUs accepted and processed by the SNMP protocol entity.
snmpOutTooBigs	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as "tooBig."
snmpOutNoSuchNames	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status as "noSuchName."

Table 8-15 show snmp counters Output Details (Continued)

Output Field	What It Displays...
snmpOutBadValues	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as "badValue."
snmpOutGenErrs	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as "genErr."
snmpOutGetRequests	Number of SNMP Get-Request PDUs generated by the SNMP protocol entity.
snmpOutGetNexts	Number of SNMP Get-Next PDUs generated by the SNMP protocol entity.
snmpOutSetRequests	Number of SNMP Set-Request PDUs generated by the SNMP protocol entity.
snmpOutGetResponses	Number of SNMP Get-Response PDUs generated by the SNMP protocol entity.
snmpOutTraps	Number of SNMP Trap PDUs generated by the SNMP protocol entity.
snmpSilentDrops	Number of SNMP Get, Set, or Inform request error messages that were dropped because the reply was larger than the requestor’s maximum message size.
snmpProxyDrops	Number of SNMP Get, Set, or Inform request error messages that were dropped because the reply was larger than the proxy target’s maximum message size.
usmStatsUnsupportedSec Levels	Number of packets received by the SNMP engine that were dropped because they requested a security level that was unknown to the SNMP engine or otherwise unavailable.
usmStatsNotInTimeWindows	Number of packets received by the SNMP engine that were dropped because they appeared outside of the authoritative SNMP engine's window.
usmStatsUnknownUserNames	Number of packets received by the SNMP engine that were dropped because they referenced a user that was not known to the SNMP engine.
usmStatsUnknownEngineIDs	Number of packets received by the SNMP engine that were dropped because they referenced an snmpEngineID that was not known to the SNMP engine.
usmStatsWrongDigests	Number of packets received by the SNMP engine that were dropped because they did not contain the expected digest value.
usmStatsDecriptionErrors	Number of packets received by the SNMP engine that were dropped because they could not be decrypted.

Configuring SNMP Users, Groups, and Communities

Purpose

To review and configure SNMP users, groups, and v1 and v2 communities. These are defined as follows:

- User — A person registered in SNMPv3 to access SNMP management.
- Group — A collection of users who share the same SNMP access privileges.
- Community — A name used to authenticate SNMPv1 and v2 users.

Commands

For information about...	Refer to page...
show snmp user	8-8
set snmp user	8-9
clear snmp user	8-10
show snmp group	8-11
set snmp group	8-12
clear snmp group	8-12
show snmp community	8-13
set snmp community	8-14
clear snmp community	8-14

show snmp user

Use this command to display information about SNMP users. These are people registered to access SNMP management.

Syntax

show snmp user [**list**] | [*user*] | [**remote** *remote*] [**volatile** | **nonvolatile** | **read-only**]

Parameters

list	(Optional) Displays a list of registered SNMP user names.
user	(Optional) Displays information about a specific user.
remote *remote*	(Optional) Displays information about users on a specific remote SNMP engine.
volatile | **nonvolatile** | **read-only**	(Optional) Displays user information for a specified storage type.

Defaults

If **list** is not specified, detailed SNMP information will be displayed.

If *user* is not specified, information about all SNMP users will be displayed.

If **remote** is not specified, user information about the local SNMP engine will be displayed.

If not specified, user information for all storage types will be displayed.

Mode

Switch command, read-only.

Examples

This example shows how to display an SNMP user list:

```
B2(su)->show snmp user list
--- SNMP user information ---
--- List of registered users:
Guest
admin1
admin2
netops
```

This example shows how to display information for the SNMP "guest" user:

```
(su)->show snmp user guest
--- SNMP user information ---
EngineId:  00:00:00:63:00:00:00:a1:00:00:00:00
Username                = Guest
Auth protocol           = usmNoAuthProtocol
Privacy protocol        = usmNoPrivProtocol
Storage type            = nonVolatile
Row status              = active
```

Table 8-16 provides an explanation of the command output.

Table 8-16 show snmp user Output Details

Output Field	What It Displays...
EngineId	SNMP local engine identifier.
Username	SNMPv1 or v2 community name or SNMPv3 user name.
Auth protocol	Type of authentication protocol applied to this user.
Privacy protocol	Whether a privacy protocol is applied when authentication protocol is in use.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

set snmp user

Use this command to create a new SNMPv3 user.

Syntax

set snmp user *user* [**remote** *remoteid*] [**authentication** {**md5** | **sha**}] [*authpassword*] [**privacy** *privpassword*] [**volatile** | **nonvolatile**]

Parameters

user	Specifies a name for the SNMPv3 user.
remote *remoteid*	(Optional) Registers the user on a specific remote SNMP engine.
authentication md5 | sha	(Optional) Specifies the authentication type required for this user as MD5 or SHA.
authpassword	(Optional) Specifies a password for this user when authentication is required. Minimum of 8 characters.
privacy *privpassword*	(Optional) Applies encryption and specifies an encryption password. Minimum of 8 characters.
volatile | nonvolatile	(Optional) Specifies a storage type for this user entry.

Defaults

If **remote** is not specified, the user will be registered for the local SNMP engine.

If **authentication** is not specified, no authentication will be applied.

If **privacy** is not specified, no encryption will be applied.

If storage type is not specified, **nonvolatile** will be applied.

Mode

Switch command, read-write.

Example

This example shows how to create a new SNMP user named "netops**".** By default, this user will be registered on the local SNMP engine without authentication and encryption. Entries related to this user will be stored in permanent (nonvolatile) memory:

```
B2(su)->set snmp user netops
```

clear snmp user

Use this command to remove a user from the SNMPv3 security-model list.

Syntax

clear snmp user *user* [**remote** *remote*]

Parameters

user	Specifies an SNMPv3 user to remove.
remote *remote*	(Optional) Removes the user from a specific remote SNMP engine.

Defaults

If **remote** is not specified, the user will be removed from the local SNMP engine.

Mode

Switch command, read-write.

Example

This example shows how to remove the SNMP user named "bill":

```
B2(su)->clear snmp user bill
```

show snmp group

Use this command to display an SNMP group configuration. An SNMP group is a collection of SNMPv3 users who share the same access privileges.

Syntax

show snmp group [**groupname** *groupname*] [**user** *user*] [**security-model** {**v1** | **v2c** | **usm**}] [**volatile** | **nonvolatile** | **read-only**]

Parameters

groupname *groupname*	(Optional) Displays information for a specific SNMP group.
user *user*	(Optional) Displays information about users within the specified group.
security-model v1 | **v2c** | **usm**	(Optional) Displays information about groups assigned to a specific security SNMP model.
volatile | **nonvolatile** | **read-only**	(Optional) Displays SNMP group information for a specified storage type.

Defaults

If *groupname* is not specified, information about all SNMP groups will be displayed.

If *user* is not specified, information about all SNMP users will be displayed.

If **security-model** is not specified, user information about all SNMP versions will be displayed.

If not specified, information for all storage types will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP group information:

```
B2(su)->show snmp group
--- SNMP group information ---
Security model          = SNMPv1
Security/user name      = public
Group name              = Anyone
Storage type            = nonVolatile
Row status              = active

Security model          = SNMPv1
Security/user name      = public.router1
Group name              = Anyone
Storage type            = nonVolatile
Row status              = active
```

Table 8-17 provides an explanation of the command output.

Table 8-17 show snmp group Output Details

Output Field	What It Displays...
Security model	SNMP version associated with this group.
Security/user name	User belonging to the SNMP group.
Group name	Name of SNMP group.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

set snmp group

Use this command to create an SNMP group. This associates SNMPv3 users to a group that shares common access privileges.

Syntax

set snmp group *groupname* **user** *user* **security-model** {**v1** | **v2c** | **usm**} [**volatile** | **nonvolatile**]

Parameters

groupname	Specifies an SNMP group name to create.
user *user*	Specifies an SNMPv3 user name to assign to the group.
security-model v1 | **v2c** | **usm**	Specifies an SNMP security model to assign to the group.
volatile | **nonvolatile**	(Optional) Specifies a storage type for SNMP entries associated with the group.

Defaults

If storage type is not specified, **nonvolatile** storage will be applied.

Mode

Switch command, read-write.

Example

This example shows how to create an SNMP group called “anyone”, assign a user named “public” and assign SNMPv3 security to the group:

```
B2(su)->set snmp group anyone user public security-model usm
```

clear snmp group

Use this command to clear SNMP group settings globally or for a specific SNMP group and user.

Syntax

clear snmp group *groupname user* [**security-model** {**v1** | **v2c** | **usm**}]

Parameters

groupname	Specifies the SNMP group to be cleared.
user	Specifies the SNMP user to be cleared.
security-model v1 | v2c | usm	(Optional) Clears the settings associated with a specific security model.

Defaults

```
If not specified, settings related to all security models will be cleared.
```

Mode

Switch command, read-write.

Example

This example shows how to clear all settings assigned to the "public" user within the SNMP group "anyone":

```
B2(su)->clear snmp group anyone public
```

show snmp community

Use this command to display SNMP community names and status. In SNMPv1 and v2, community names act as passwords to remote management.

Syntax

show snmp community [*name*]

Parameters

name	(Optional) Displays SNMP information for a specific community name.

Defaults

If *name* is not specified, information will be displayed for all SNMP communities.

Mode

Switch command, read-only.

Example

This example shows how to display information about the SNMP "public" community name. For a description of this output, refer to **set snmp community** (page 8-14).

```
B2(su)->show snmp community public

--- Configured community strings ---

Name            = *********
Security name   = public
Context         =
Transport tag   =
Storage type    = nonVolatile
Status          = active
```

set snmp community

Use this command to configure an SNMP community group.

Syntax

set snmp community *community* [**securityname** *securityname*] [**context** *context*] [**transport** *transport*] [**volatile** | **nonvolatile**]

Parameters

community	Specifies a community group name.
securityname *securityname*	(Optional) Specifies an SNMP security name to associate with this community.
context *context*	(Optional) Specifies a subset of management information this community will be allowed to access. Valid values are full or partial context names. To review all contexts configured for the device, use the **show snmp context** command as described in "show snmp context" on page 8-20.
transport *transport*	(Optional) Specifies the set of transport endpoints from which SNMP request with this community name will be accepted. Makes a link to a target address table.
volatile | **nonvolatile**	(Optional) Specifies the storage type for these entries.

Defaults

If **securityname** is not specified, the *community* name will be used.

If **context** is not specified, access will be granted for the default context.

If **transport** tag is not specified, none will be applied.

If storage type is not specified, **nonvolatile** will be applied.

Mode

Switch command, read-write.

Example

This example shows how to set an SNMP community name called "vip"

```
B2(su)->set snmp community vip
```

clear snmp community

Use this command to delete an SNMP community name.

Syntax

clear snmp community *name*

Parameters

name	Specifies the SNMP community name to clear.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete the community name "vip."

```
B2(su)->clear snmp community vip
```

Configuring SNMP Access Rights

Purpose

To review and configure SNMP access rights, assigning viewing privileges and security levels to SNMP user groups.

Commands

For information about...	Refer to page...
show snmp access	8-15
set snmp access	8-17
clear snmp access	8-18

show snmp access

Use this command to display access rights and security levels configured for SNMP one or more groups.

Syntax

show snmp access [*groupname*] **[security-model {v1 | v2c | usm}] [noauthentication | authentication | privacy]** [**context** *context*] [**volatile** | **nonvolatile | read-only**]

Parameters

groupname	(Optional) Displays access information for a specific SNMPv3 group.
security-model v1 | v2c | usm	(Optional) Displays access information for SNMP security model version 1, 2c or 3 (usm).
noauthentication | authentication | privacy	(Optional) Displays access information for a specific security level.

context *context*	(Optional) Displays access information for a specific context. For a description of how to specify SNMP contexts, refer to "Using SNMP Contexts to Access Specific MIBs" on page 8-3.
volatile | **nonvolatile** | **read-only**	(Optional) Displays access entries for a specific storage type.

Defaults

If *groupname* is not specified, access information for all SNMP groups will be displayed.

If **security-mode**l is not specified, access information for all SNMP versions will be displayed.

If **noauthentication**, **authentication** or **privacy** are not specified, access information for all security levels will be displayed.

If **context** is not specified, all contexts will be displayed.

If **volatile**, **nonvolatile** or **read-only** are not specified, all entries of all storage types will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP access information:

```
B2(su)->show snmp access
Group           = SystemAdmin
Security model  = USM
Security level  = noAuthNoPriv
Read View       = All
Write View      =
Notify View     = All
Context match   = exact match
Storage type    = nonVolatile
Row status      = active

Group           = NightOperator
Security model  = USM
Security level  = noAuthNoPriv
Read View       = All
Write View      =
Notify View     = All
Context match   = exact match
Storage type    = nonVolatile
Row status      = active
```

Table 8-18 provides an explanation of the command output.

Table 8-18 show snmp access Output Details

Output Field	What It Displays...
Group	SNMP group name.
Security model	Security model applied to this group. Valid types are: **SNMPv1**, **SNMPv2c**, and SNMPv3 (User based - **USM**).

Table 8-18 show snmp access Output Details (Continued)

Output Field	What It Displays...
Security level	Security level applied to this group. Valid levels are: • noAuthNoPrivacy (**no authentication** required) • AuthNoPrivacy (**authentication** required) • authPriv (**privacy** -- most secure level)
Read View	Name of the view that allows this group to view SNMP MIB objects.
Write View	Name of the view that allows this group to configure the contents of the SNMP agent**.**
Notify View	Name of the view that allows this group to send an SNMP trap message.
Context match	Whether or not SNMP context match must be exact (full context name match) or a partial match with a given prefix.
Storage type	Whether access entries for this group are stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

set snmp access

Use this command to set an SNMP access configuration.

Syntax

set snmp access *groupname* **security-model** {**v1** | **v2c** | **usm**} [**noauthentication** | **authentication** | **privacy**] [**context** *context*] [**exact** | **prefix**] [**read** *read*] [**write** *write*] [**notify** *notify*] [**volatile** | **nonvolatile**]

Parameters

groupname	Specifies a name for an SNMPv3 group.
security-model v1 | **v2c** | **usm**	Specifies SNMP version 1, 2c or 3 (usm).
noauthentication | **authentication** | **privacy**	(Optional) Applies SNMP security level as no authentication, authentication (without privacy) or privacy. Privacy specifies that messages sent on behalf of the user are protected from disclosure.
context *context* **exact** | **prefix**	(Optional) Sets the context for this access configuration and specifies that the match must be exact (matching the whole context string) or a prefix match only. Context is a subset of management information this SNMP group will be allowed to access. Valid values are full or partial context names. To review all contexts configured for the device, use the **show snmp context** command as described in "show snmp context" on page 8-20.
read *read*	(Optional) Specifies a read access view.
write *write*	(Optional) Specifies a write access view.
notify *notify*	(Optional) Specifies a notify access view.
volatile | **nonvolatile** | **read-only**	(Optional) Stores associated SNMP entries as temporary or permanent, or read-only.

Defaults

If security level is not specified, no authentication will be applied.

If **context** is not specified, access will be enabled for the default context. If **context** is specified without a context match, **exact** match will be applied.

If **read** view is not specified none will be applied.

If **write** view is not specified, none will be applied.

If **notify** view is not specified, none will be applied.

If storage type is not specified, entries will be stored as permanent and will be held through device reboot.

Mode

Switch command, read-write.

Example

This example permits the "powergroup" to manage all MIBs via SNMPv3:

```
B2(su)->set snmp access powergroup security-model usm
```

clear snmp access

Use this command to clear the SNMP access entry of a specific group, including its set SNMP security-model, and level of security.

Syntax

clear snmp access *groupname* **security-model** {**v1** | **v2c** | **usm**} [**noauthentication** | **authentication** | **privacy**] [**context** *context*]

Parameters

groupname	Specifies the name of the SNMP group for which to clear access.
security-model v1 | **v2c** | **usm**	Specifies the security model to be cleared for the SNMP access group.
noauthentication | **authentication** | **privacy**	(Optional) Clears a specific security level for the SNMP access group.
context *context*	(Optional) Clears a specific context for the SNMP access group. Enter / - / to clear the default context.

Defaults

If security level is not specified, all levels will be cleared.

If **context** is not specified, none will be applied.

Mode

Switch command, read-write.

Example

This example shows how to clear SNMP version 3 access for the “mis-group” via the authentication protocol:

```
B2(su)->clear snmp access mis-group security-model usm authentication
```

Configuring SNMP MIB Views

Purpose

To review and configure SNMP MIB views. SNMP views map SNMP objects to access rights.

Commands

For information about...	Refer to page...
show snmp view	8-19
show snmp context	8-20
set snmp view	8-21
clear snmp view	8-22

show snmp view

Use this command to display the MIB configuration for SNMPv3 view-based access (VACM).

Syntax

show snmp view [*viewname*] [**subtree** *oid-or-mibobject*] [**volatile** | **nonvolatile** | **read-only**]

Parameters

viewname	(Optional) Displays information for a specific MIB view.
subtree *oid-or-mibobject*	(Optional) Displays information for a specific MIB subtree when *viewname* is specified.
volatile | **nonvolatile** | **read-only**	(Optional) Displays entries for a specific storage type.

Defaults

If no parameters are specified, all SNMP MIB view configuration information will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP MIB view configuration information:

```
B2(su)->show snmp view

 --- SNMP MIB View information ---
View Name       = All
Subtree OID     = 1
Subtree mask    =
View Type       = included
Storage type    = nonVolatile
Row status      = active

View Name       = All
Subtree OID     = 0.0
Subtree mask    =
View Type       = included
Storage type    = nonVolatile
Row status      = active

View Name       = Network
Subtree OID     = 1.3.6.1.2.1
Subtree mask    =
View Type       = included
Storage type    = nonVolatile
Row status      = active
```

Table 8-19 provides an explanation of the command output. For details on using the **set snmp view** command to assign variables, refer to "set snmp view" on page 8-21.

Table 8-19 show snmp view Output Details

Output Field	What It Displays...
View Name	Name assigned to a MIB view.
Subtree OID	Name identifying a MIB subtree.
Subtree mask	Bitmask applied to a MIB subtree.
View Type	Whether or not subtree use must be **included** or **excluded** for this view.
Storage type	Whether storage is in **nonVolatile** or **Volatile** memory
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

show snmp context

Use this command to display the context list configuration for SNMP's view-based access control.

Syntax

show snmp context

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Usage

An SNMP context is a collection of management information that can be accessed by an SNMP agent or entity. The default context allows all SNMP agents to access all management information (MIBs). When created using the **set snmp access** command ("set snmp access" on page 8-17), other contexts can be applied to limit access to a subset of management information.

Example

This example shows how to display a list of all SNMP contexts known to the device:

```
B2(su)->show snmp context

--- Configured contexts:
default context (all mibs)
```

set snmp view

Use this command to set a MIB configuration for SNMPv3 view-based access (VACM).

Syntax

set snmp view viewname *viewname* **subtree** *subtree* [**mask** *mask*] [**included** | **excluded**] [**volatile** | **nonvolatile**]

Parameters

viewname *viewname*	Specifies a name for a MIB view.
subtree *subtree*	Specifies a MIB subtree name.
mask *mask*	(Optional) Specifies a bitmask for a subtree.
included | **excluded**	(Optional) Specifies subtree use (default) or no subtree use.
volatile | **nonvolatile**	(Optional) Specifies the use of temporary or permanent (default) storage.

Defaults

If not specified, **mask** will be set to **255.255.255.255**

If not specified, subtree use will be **included**.

If storage type is not specified, **nonvolatile** (permanent) will be applied.

Mode

Switch command, read-write.

Example

This example shows how to set an SNMP MIB view to "public" with a subtree name of 1.3.6.1 included:

```
B2(su)->set snmp view viewname public subtree 1.3.6.1 included
```

clear snmp view

Use this command to delete an SNMPv3 MIB view.

Syntax

clear snmp view *viewname subtree*

Parameters

viewname	Specifies the MIB view name to be deleted.
subtree	Specifies the subtree name of the MIB view to be deleted.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete SNMP MIB view "public":

```
B2(su)->clear snmp view public 1.3.6.1
```

Configuring SNMP Target Parameters

Purpose

To review and configure SNMP target parameters. This controls where and under what circumstances SNMP notifications will be sent. A target parameter entry can be bound to a target IP address allowed to receive SNMP notification messages with the **set snmp targetaddr** command ("set snmp targetaddr" on page 8-26).

Commands

For information about...	Refer to page...
show snmp targetparams	8-22
set snmp targetparams	8-24
clear snmp targetparams	8-24

show snmp targetparams

Use this command to display SNMP parameters used to generate a message to a target.

Syntax

show snmp targetparams [*targetParams*] [**volatile** | **nonvolatile** | **read-only**]

Parameters

targetParams	(Optional) Displays entries for a specific target parameter.
volatile | **nonvolatile** | **read-only**	(Optional) Displays target parameter entries for a specific storage type.

Defaults

If *targetParams* is not specified, entries associated with all target parameters will be displayed.

If not specified, entries of all storage types will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP target parameters information:

```
B2(su)->show snmp targetparams

--- SNMP TargetParams information ---
Target Parameter Name   = v1ExampleParams
Security Name           = public
Message Proc. Model     = SNMPv1
Security Level          = noAuthNoPriv
Storage type            = nonVolatile
Row status              = active
Target Parameter Name   = v2cExampleParams
Security Name           = public
Message Proc. Model     = SNMPv2c
Security Level          = noAuthNoPriv
Storage type            = nonVolatile
Row status              = active

Target Parameter Name   = v3ExampleParams
Security Name           = CharlieDChief
Message Proc. Model     = USM
Security Level          = authNoPriv
Storage type            = nonVolatile
Row status              = active
```

Table 8-20 provides an explanation of the command output.

Table 8-20 show snmp targetparams Output Details

Output Field	What It Displays...
Target Parameter Name	Unique identifier for the parameter in the SNMP target parameters table. Maximum length is 32 bytes.
Security Name	Security string definition.
Message Proc. Model	SNMP version.
Security Level	Type of security level (**auth**: security level is set to use authentication protocol, **noauth**: security level is not set to use authentication protocol, or **privacy**).
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

set snmp targetparams

Use this command to set SNMP target parameters, a named set of security/authorization criteria used to generate a message to a target.

Syntax

set snmp targetparams *paramsname* **user** *user* **security-model** {**v1** | **v2c** | **usm**} **message-processing** {**v1** | **v2c** | **v3**} [**noauthentication** | **authentication** | **privacy**] [**volatile** | **nonvolatile**]

Parameters

paramsname	Specifies a name identifying parameters used to generate SNMP messages to a particular target.
user *user*	Specifies an SNMPv1 or v2 community name or an SNMPv3 user name. Maximum length is 32 bytes.
security-model v1 | **v2c** | **usm**	Specifies the SNMP security model applied to this target parameter as version 1, 2c or 3 (usm).
message-processing v1 | **v2c** | **v3**	Specifies the SNMP message processing model applied to this target parameter as version 1, 2c or 3.
noauthentication | **authentication** | **privacy**	(Optional) Specifies the SNMP security level applied to this target parameter as no authentication, authentication (without privacy) or privacy. Privacy specifies that messages sent on behalf of the user are protected from disclosure.
volatile | **nonvolatile**	(Optional) Specifies the storage type applied to this target parameter.

Defaults

None.

If not specified, security level will be set to **noauthentication.**

If not specified, storage type will be set to **nonvolatile**.

Mode

Switch command, read-write.

Example

This example shows how to set SNMP target parameters named “v1ExampleParams” for a user named “fred” using version 3 security model and message processing, and authentication:

```
B2(su)->set snmp targetparams v1ExampleParams user fred security-model usm
message-processing v3 authentication
```

clear snmp targetparams

Use this command to clear the SNMP target parameter configuration.

Syntax

clear snmp targetparams *targetParams*

Parameters

targetParams	Specifies the name of the parameter in the SNMP target parameters table to be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear SNMP target parameters named "v1ExampleParams":

```
B2(su)->clear snmp targetparams v1ExampleParams
```

Configuring SNMP Target Addresses

Purpose

To review and configure SNMP target addresses which will receive SNMP notification messages. An address configuration can be linked to optional SNMP transmit, or target, parameters (such as timeout, retry count, and UDP port) set with the **set snmp targetparams** command (page 8-24).

Commands

For information about...	Refer to page...
show snmp targetaddr	8-25
set snmp targetaddr	8-26
clear snmp targetaddr	8-28

show snmp targetaddr

Use this command to display SNMP target address information.

Syntax

show snmp targetaddr [*targetAddr*] [**volatile** | **nonvolatile** | **read-only**]

Parameters

targetAddr	(Optional) Displays information for a specific target address name.
volatile | **nonvolatile** | **read-only**	(Optional) When target address is specified, displays target address information for a specific storage type.

Defaults

If *targetAddr* is not specified, entries for all target address names will be displayed.

If not specified, entries of all storage types will be displayed for a target address.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP target address information:

```
B2(su)->show snmp targetaddr
Target Address Name     = labmachine
Tag List                = v2cTrap
IP Address              = 10.2.3.116
UDP Port#               = 162
Target Mask             = 255.255.255.255
Timeout                 = 1500
Retry count             = 4
Parameters              = v2cParams
Storage type            = nonVolatile
Row status              = active
```

Table 8-21 provides an explanation of the command output.

Table 8-21 show snmp targetaddr Output Details

Output Field	What It Displays...
Target Address Name	Unique identifier in the snmpTargetAddressTable.
Tag List	Tags a location to the target address as a place to send notifications.
IP Address	Target IP address.
UDP Port#	Number of the UDP port of the target host to use.
Target Mask	Target IP address mask.
Timeout	Timeout setting for the target address.
Retry count	Retry setting for the target address.
Parameters	Entry in the snmpTargetParamsTable.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

set snmp targetaddr

Use this command to configure an SNMP target address. The target address is a unique identifier and a specific IP address that will receive SNMP notification messages and determine which community strings will be accepted. This address configuration can be linked to optional SNMP transmit parameters (such as timeout, retry count, and UDP port).

Syntax

set snmp targetaddr *targetaddr ipaddr* **param** *param* [**udpport** *udpport*] [**mask** *mask*] [**timeout** *timeout*] [**retries** *retries*] [**taglist** *taglist*] [**volatile** | **nonvolatile**]

Parameters

targetaddr	Specifies a unique identifier to index the snmpTargetAddrTable. Maximum length is 32 bytes.
ipaddr	Specifies the IP address of the target.
param *param*	Specifies an entry in the SNMP target parameters table, which is used when generating a message to the target. Maximum length is 32 bytes.
udpport *udpport*	(Optional) Specifies which UDP port of the target host to use.
mask *mask*	(Optional) Specifies the IP mask of the target.
timeout *timeout*	(Optional) Specifies the maximum round trip time allowed to communicate to this target address. This value is in .01 seconds and the default is 1500 (15 seconds.)
retries *retries*	(Optional) Specifies the number of message retries allowed if a response is not received. Default is 3.
taglist *taglist*	(Optional) Specifies a list of SNMP notify tag values. This tags a location to the target address as a place to send notifications. List must be enclosed in quotes and tag values must be separated by a space (for example, **"tag 1 tag 2"**).
volatile | **nonvolatile**	(Optional) Specifies temporary (default), or permanent storage for SNMP entries.

Defaults

If not specified, *udpport* will be set to **162**.

If not specified, *mask* will be set to **255.255.255.255**

If not specified, *timeout* will be set to **1500**.

If not specified, number of *retries* will be set to **3**.

If **taglist** is not specified, none will be set.

If not specified, storage type will be **nonvolatile**.

Mode

Switch command, read-write.

Example

This example shows how to configure a trap notification called "**TrapSink."** This trap notification will be sent to the workstation 192.168.190.80 (which is target address "tr"). It will use security and authorization criteria contained in a target parameters entry called "v2cExampleParams". For more information on configuring a basic SNMP trap, refer to "Creating a Basic SNMP Trap Configuration" on page 8-37:

```
B2(su)->set snmp targetaddr tr 192.168.190.80 param v2cExampleParams taglist
TrapSink
```

clear snmp targetaddr

Use this command to delete an SNMP target address entry.

Syntax

clear snmp targetaddr *targetAddr*

Parameters

targetAddr	Specifies the target address entry to delete.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear SNMP target address entry "tr":

```
B2(su)->clear snmp targetaddr tr
```

Configuring SNMP Notification Parameters

About SNMP Notify Filters

Profiles indicating which targets should not receive SNMP notification messages are kept in the NotifyFilter table. If this table is empty, meaning that no filtering is associated with any SNMP target, then no filtering will take place. "Traps" or "informs" notifications will be sent to all destinations in the SNMP targetAddrTable that have tags matching those found in the NotifyTable.

When the NotifyFilter table contains profile entries, the SNMP agent will find any filter profile name that corresponds to the target parameter name contained in an outgoing notification message. It will then apply the appropriate subtree-specific filter when generating notification messages.

Purpose

To configure SNMP notification parameters and optional filters. Notifications are entities which handle the generation of SNMP v1 and v2 "traps" or SNMP v3 "informs" messages to select management targets. Optional notification filters identify which targets should not receive notifications. For a sample SNMP trap configuration showing how SNMP notification parameters are associated with security and authorization criteria (target parameters) and mapped to a management target address, refer to "Creating a Basic SNMP Trap Configuration" on page 8-37.

Commands

For information about...	Refer to page...
show newaddrtrap	8-29
set newaddrtrap	8-30
show snmp notify	8-30
set snmp notify	8-31
clear snmp notify	8-32
show snmp notifyfilter	8-33
set snmp notifyfilter	8-34
clear snmp notifyfilter	8-34
show snmp notifyprofile	8-35
set snmp notifyprofile	8-36
clear snmp notifyprofile	8-36

show newaddrtrap

Use this command to display the global and port-specific status of the SNMP new MAC addresses trap function.

Syntax

show newaddrtrap [*port-string*]

Parameters

port-string	(Optional) Displays the status of the new MAC addresses trap function on specific ports.

Defaults

If *port-string* is not specified, the status of the new MAC addresses trap function will be displayed for all ports.

Mode

Switch command, read-only.

Usage

By default, this function is disabled globally and per port.

Example

This example displays the status for Gigabit Ethernet ports 1 through 5 in slot 1.

```
B2(ro)->show newaddrtrap ge.1.1-5
New Address Traps Globally disabled

Port      Enable State
--------- ------------
```

```
ge.1.1    disabled
ge.1.2    disabled
ge.1.3    disabled
ge.1.4    disabled
ge.1.5    disabled
```

set newaddrtrap

Use this command to enable or disable SNMP trap messaging, globally or on one or more ports, when new source MAC addresses are detected.

Syntax

set newaddrtrap [*port-string*] {**enable** | **disable**}

Parameters

port-string	(Optional) Enable or disable the new MAC addresses trap function on specific ports.
enable | **disable**	Enable or disable the new MAC addresses trap function. If entered without the *port-string* parameter, enables or disables the function globally. When entered with the *port-string* parameter, enables or disables the function on specific ports.

Defaults

If *port-string* is not specified, the trap function is set globally.

Mode

Switch mode, read-write.

Usage

This command enables and disables sending SNMP trap messages when a new source MAC address is detected by a port. If the port is a CDP port, however, traps for new source MAC addresses will not be sent.

The default mode is disabled globally and per port.

Example=

This example enables the trap function globally and then on Gigabit Ethernet ports 1 through 5 in slot 1.

```
B2(rw)->set newaddrtrap enable
B2(rw)->set newaddrtrap ge.1.1-5 enable
```

show snmp notify

Use this command to display the SNMP notify configuration, which determines the management targets that will receive SNMP notifications.

Syntax

show snmp notify [*notify*] [**volatile** | **nonvolatile** | **read-only**]

Parameters

notify	(Optional) Displays notify entries for a specific notify name.
volatile | **nonvolatile** | **read-only**	(Optional) Displays notify entries for a specific storage type.

Defaults

If a *notify* name is not specified, all entries will be displayed.

If **volatile**, **nonvolatile**, or **read-only** are not specified, all storage type entries will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the SNMP notify information:

```
B2(su)->show snmp notify

 --- SNMP notifyTable information ---
Notify name     = 1
Notify Tag      = Console
Notify Type     = trap
Storage type    = nonVolatile
Row status      = active

Notify name     = 2
Notify Tag      = TrapSink
Notify Type     = trap
Storage type    = nonVolatile
Row status      = active
```

Table 8-22 provides an explanation of the command output.

Table 8-22 show snmp notify Output Details

Output Field	What It Displays...
Notify name	A unique identifier used to index the SNMP notify table.
Notify Tag	Name of the entry in the SNMP notify table.
Notify Type	Type of notification: SNMPv1 or v2 **trap** or SNMPv3 **InformRequest** message.
Storage type	Whether access entry is stored in **volatile**, **nonvolatile**, or **read-only** memory.
Row status	Status of this entry: **active**, **notInService**, or **notReady**.

set snmp notify

Use this command to set the SNMP notify configuration. This creates an entry in the SNMP notify table, which is used to select management targets who should receive notification messages. This

command's **tag** parameter can be used to bind each entry to a target address using the **set snmp targetaddr** command ("set snmp targetaddr" on page 8-26).

Syntax

set snmp notify *notify* **tag** *tag* [**trap** | **inform**] [**volatile** | **nonvolatile**]

Parameters

notify	Specifies an SNMP notify name.
tag *tag*	Specifies an SNMP notify tag. This binds the notify name to the SNMP target address table.
trap | **inform**	(Optional) Specifies SNMPv1 or v2 Trap messages (default) or SNMP v3 InformRequest messages.
volatile | **nonvolatile**	(Optional) Specifies temporary (default), or permanent storage for SNMP entries.

Defaults

If not specified, message type will be set to **trap**.

If not specified, storage type will be set to **nonvolatile**.

Mode

Switch command, read-write.

Example

This example shows how to set an SNMP notify configuration with a notify name of "hello" and a notify tag of "world". Notifications will be sent as trap messages and storage type will automatically default to permanent:

```
B2(su)->set snmp notify hello tag world trap
```

clear snmp notify

Use this command to clear an SNMP notify configuration.

Syntax

clear snmp notify *notify*

Parameters

notify	Specifies an SNMP notify name to clear.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the SNMP notify configuration for "hello":

```
B2(su)->clear snmp notify hello
```

show snmp notifyfilter

Use this command to display SNMP notify filter information, identifying which profiles will not receive SNMP notifications.

Syntax

show snmp notifyfilter [*profile*] [**subtree** *oid-or-mibobject*] [**volatile** | **nonvolatile** | **read-only**]

Parameters

profile	(Optional) Displays a specific notify filter.
subtree *oid-or-mibobject*	(Optional) Displays a notify filter within a specific subtree.
volatile | **nonvolatile** | **read-only**	(Optional) Displays notify filter entries of a specific storage type.

Defaults

If no parameters are specified, all notify filter information will be displayed.

Mode

Switch command, read-only.

Usage

See "About SNMP Notify Filters" on page 8-28 for more information about notify filters.

Example

This example shows how to display SNMP notify filter information. In this case, the notify profile "pilot1" in subtree 1.3.6 will not receive SNMP notification messages:

```
B2(su)->show snmp notifyfilter

--- SNMP notifyFilter information ---
Profile         = pilot1
Subtree         = 1.3.6
Filter type     = included
Storage type    = nonVolatile
Row status      = active
```

set snmp notifyfilter

Use this command to create an SNMP notify filter configuration. This identifies which management targets should NOT receive notification messages, which is useful for fine-tuning the amount of SNMP traffic generated.

Syntax

set snmp notifyfilter *profile* **subtree** *oid-or-mibobject* [**mask** *mask*] [**included** | **excluded**] [**volatile** | **nonvolatile**]

Parameters

profile	Specifies an SNMP filter notify name.
subtree *oid-or-mibobject*	Specifies a MIB subtree ID target for the filter.
mask *mask*	(Optional) Applies a subtree mask.
included | **excluded**	(Optional) Specifies that subtree is included or excluded.
volatile | **nonvolatile**	(Optional) Specifies a storage type.

Defaults

If not specified, **mask** is not set.

If not specified, subtree will be **included**.

If storage type is not specified, **nonvolatile** (permanent) will be applied.

Mode

Switch command, read-write.

Usage

See "About SNMP Notify Filters" on page 8-28 for more information about notify filters.

Example

This example shows how to create an SNMP notify filter called "pilot1" with a MIB subtree ID of 1.3.6:

```
B2(su)->set snmp notifyfilter pilot1 subtree 1.3.6
```

clear snmp notifyfilter

Use this command to delete an SNMP notify filter configuration.

Syntax

clear snmp notifyfilter *profile* **subtree** *oid-or-mibobject*

Parameters

profile	Specifies an SNMP filter notify name to delete.
subtree *oid-or-mibobject*	Specifies a MIB subtree ID containing the filter to be deleted.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete the SNMP notify filter "pilot1":

```
B2(su)->clear snmp notifyfilter pilot1 subtree 1.3.6
```

show snmp notifyprofile

Use this command to display SNMP notify profile information. This associates target parameters to an SNMP notify filter to determine who should not receive SNMP notifications.

Syntax

show snmp notifyprofile [*profile*] [**targetparam** *targetparam]* [**volatile** | **nonvolatile** | **read-only**]

Parameters

profile	(Optional) Displays a specific notify profile.
targetparam *targetparam*	(Optional) Displays entries for a specific target parameter.
volatile | **nonvolatile** | **read-only**	(Optional) Displays notify filter entries of a specific storage type.

Defaults

If no parameters are specified, all notify profile information will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display SNMP notify information for the profile named "area51":

```
B2(su)->show snmp notifyprofile area51

 --- SNMP notifyProfile information ---
Notify Profile  = area51
TargetParam     = v3ExampleParams
Storage type    = nonVolatile
```

```
Row status      = active
```

set snmp notifyprofile

Use this command to create an SNMP notify filter profile configuration. This associates a notification filter, created with the **set snmp notifyfilter** command ("set snmp notifyfilter" on page 8-34), to a set of SNMP target parameters to determine which management targets should not receive SNMP notifications.

Syntax

set snmp notifyprofile *profile* **targetparam** *targetparam* [**volatile** | **nonvolatile**]

Parameters

profile	Specifies an SNMP filter notify name.
targetparam *targetparam*	Specifies an associated entry in the SNMP Target Params Table.
volatile | **nonvolatile**	(Optional) Specifies a storage type.

Defaults

If storage type is not specified, **nonvolatile** (permanent) will be applied.

Mode

Switch command, read-write.

Example

This example shows how to create an SNMP notify profile named area51 and associate a target parameters entry.

```
B2(su)->set snmp notifyprofile area51 targetparam v3ExampleParams
```

clear snmp notifyprofile

Use this command to delete an SNMP notify profile configuration.

Syntax

clear snmp notifyprofile *profile* **targetparam** *targetparam*

Parameters

profile	Specifies an SNMP filter notify name to delete.
targetparam *targetparam*	Specifies an associated entry in the snmpTargetParamsTable.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete SNMP notify profile “area51”:

```
B2(su)->clear snmp notifyprofile area51 targetparam v3ExampleParams
```

Creating a Basic SNMP Trap Configuration

Traps are notification messages sent by an SNMPv1 or v2 agent to a network management station, a console, or a terminal to indicate the occurrence of a significant event, such as when a port or device goes up or down, when there are authentication failures, and when power supply errors occur. The following configuration example shows how to use CLI commands to associate SNMP notification parameters with security and authorization criteria (target parameters), and map the parameters to a management target address.

Note: This example illustrates how to configure an SNMPv2 trap notification. Creating an SNMPv1 or v3 Trap, or an SNMPv3 Inform notification would require using the same commands with different parameters, where appropriate. Always ensure that v1/v2 communities or v3 users used for generating traps or informs are pre-configured with enough privileges to access corresponding MIBs.

Complete an SNMPv2 trap configuration on a SecureStack B2 device as follows:

1. Create a community name that will act as an SNMP user password.
2. Create an SNMP target parameters entry to associate security and authorization criteria to the users in the community created in Step 1.
3. Verify if any applicable SNMP notification entries exist, or create a new one. You will use this entry to send SNMP notification messages to the appropriate management targets created in Step 2.
4. Create a target address entry to bind a management IP address to:
   - The notification entry and tag name created in Step 3 and
   - The target parameters entry created in Step 2.

Table 8-23 shows the commands used to complete an SNMPv2 trap configuration on a SecureStack B2 device.

Table 8-23 Basic SNMP Trap Configuration

To do this...	Use these commands...
Create a community name.	set snmp community
Create an SNMP target parameters entry.	set snmp targetparams
Verify if any applicable SNMP notification entries exist.	show snmp notify
Create a new notification entry.	set snmp notify
Create a target address entry.	set snmp targetaddr

Example

This example shows how to:

- Create an SNMP community called **mgmt**.
- Configure a trap notification called **TrapSink**.

This trap notification will be sent with the community name **mgmt** to the workstation **192.168.190.80** (which is target address **tr**). It will use security and authorization criteria contained in a target parameters entry called **v2cExampleParams**.

```
B2(su)->set snmp community mgmt
B2(su)->set snmp targetparams v2cExampleParams user mgmt
security-model v2c message-processing v2c
B2(su)->set snmp notify entry1 tag TrapSink
B2(su)->set snmp targetaddr tr 192.168.190.80 param v2cExampleParams taglist
TrapSink
```

How SNMP Will Use This Configuration

In order to send a trap/notification requested by a MIB code, the SNMP agent requires the equivalent of a trap "door", a "key" to unlock the door, and a "procedure" for crossing the doorstep. To determine if all these elements are in place, the SNMP agent proceeds as follows:

1. Determines if the "keys" for trap "doors" do exist. In the example configuration above, the key that SNMP is looking for is the notification entry created with the **set snmp notify** command which, in this case, is a key labeled **entry1**.
2. Searches for the doors matching such a key. For example, the parameters set for the **entry1** key shows that it opens only the door **TrapSink**.
3. Verifies that the specified door **TrapSink** is, in fact, available. In this case it was built using the **set snmp targetaddr** command. This command also specifies that this door leads to the management station **192.168.190.80**, and the "procedure" (**targetparams**) to cross the doorstep is called **v2ExampleParams**.
4. Verifies that the **v2ExampleParams** description of how to step through the door is, in fact, there. The agent checks **targetparams** entries and determines this description was made with the **set snmp targetparams** command, which tells exactly which SNMP protocol to use and what community name to provide. In this case, the community name is **mgmt**.
5. Verifies that the **mgmt** community name is available. In this case, it has been configured using the **set snmp community** command.
6. Sends the trap notification message.

9

Spanning Tree Configuration

This chapter describes the Spanning Tree Configuration set of commands and how to use them.

For information about...	Refer to page...
Spanning Tree Configuration Summary	9-1
Configuring Spanning Tree Bridge Parameters	9-3
Configuring Spanning Tree Port Parameters	9-33
Configuring Spanning Tree Loop Protect Parameters	9-41

Caution: Spanning Tree configuration should be performed only by personnel who are very knowledgeable about Spanning Trees and the configuration of the Spanning Tree Algorithm. Otherwise, the proper operation of the network could be at risk.

Spanning Tree Configuration Summary

Overview: Single, Rapid, and Multiple Spanning Tree Protocols

The IEEE 802.1D Spanning Tree Protocol (STP) resolves the problems of physical loops in a network by establishing one primary path between any two devices in a network. Any duplicate paths are barred from use and become standby or blocked paths until the original path fails, at which point they can be brought into service.

RSTP

The IEEE 802.1w Rapid Spanning Protocol (RSTP), an evolution of 802.1D, can achieve much faster convergence than legacy STP in a properly configured network. RSTP significantly reduces the time to reconfigure the network's active topology when physical topology or configuration parameter changes occur. It selects one switch as the root of a Spanning Tree-connected active topology and assigns port roles to individual ports on the switch, depending on whether that port is part of the active topology.

RSTP provides rapid connectivity following the failure of a switch, switch port, or a LAN. A new root port and the designated port on the other side of the bridge transition to forwarding through an explicit handshake between them. By default, user ports are configured to rapidly transition to forwarding in RSTP.

MSTP

The IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) builds upon 802.1D and RSTP by optimizing utilization of redundant links between switches in a network. When redundant links exist between a pair of switches running single STP, one link is forwarding while the others are

blocking for all traffic flowing between the two switches. The blocking links are effectively used only if the forwarding link goes down. MSTP assigns each VLAN present on the network to a particular Spanning Tree instance, allowing each switch port to be in a distinct state for each such instance: blocking for one Spanning Tree while forwarding for another. Thus, traffic associated with one set of VLANs can traverse a particular inter-switch link, while traffic associated with another set of VLANs can be blocked on that link. If VLANs are assigned to Spanning Trees wisely, no inter-switch link will be completely idle, maximizing network utilization.

For details on creating Spanning Tree instances, refer to "set spantree msti" on page 9-12.

For details on mapping Spanning Tree instances to VLANs, refer to "set spantree mstmap" on page 9-14.

Note: MSTP and RSTP are fully compatible and interoperable with each other and with legacy STP 802.1D.

Spanning Tree Features

The SecureStack B2 device meets the requirements of the Spanning Tree Protocols by performing the following functions:

- Creating a single Spanning Tree from any arrangement of switching or bridging elements.
- Compensating automatically for the failure, removal, or addition of any device in an active data path.
- Achieving port changes in short time intervals, which establishes a stable active topology quickly with minimal network disturbance.
- Using a minimum amount of communications bandwidth to accomplish the operation of the Spanning Tree Protocol.
- Reconfiguring the active topology in a manner that is transparent to stations transmitting and receiving data packets.
- Managing the topology in a consistent and reproducible manner through the use of Spanning Tree Protocol parameters.

Note: The term "bridge" is used as an equivalent to the term "switch" or "device" in this document.

Loop Protect

The Loop Protect feature prevents or short circuits loop formation in a network with redundant paths by requiring ports to receive type 2 BPDUs (RSTP/MSTP) on point-to-point inter-switch links (ISLs) before their states are allowed to become forwarding. Further, if a BPDU timeout occurs on a port, its state becomes listening until a BPDU is received.

Both upstream and downstream facing ports are protected. When a root or alternate port loses its path to the root bridge due to a message age expiration it takes on the role of designated port. It will not forward traffic until a BPDU is received. When a port is intended to be the designated port in an ISL it constantly proposes and will not forward until a BPDU is received, and will revert to listening if it fails to get a response. This protects against misconfiguration and protocol failure by the connected bridge.

The Disputed BPDU mechanism protects against looping in situations where there is one way communication. A disputed BPDU is one in which the flags field indicates a designated role and

learning and the priority vector is worse than that already held by the port. If a disputed BPDU is received, the port is forced to the listening state. When an inferior designated BPDU with the learning bit set is received on a designated port, its state is set to discarding to prevent loop formation. Note that the Dispute mechanism is always active regardless of the configuration setting of Loop Protection.

Loop Protect operates as a per port, per MST instance feature. It should be set on inter-switch links. It is comprised of several related functions:

- Control of port forwarding state based on reception of agreement BPDUs
- Control of port forwarding state based on reception of disputed BPDUs
- Communicating port non-forwarding status through traps and syslog messages
- Disabling a port based on frequency of failure events

Port forwarding state in the designated port is gated by a timer that is set upon BPDU reception. It is analogous to the rcvdInfoWhile timer the port uses when receiving root information in the root/alternate/backup role.

There are two operational modes for Loop Protect on a port. If the port is connected to a device known to implement Loop Protect, it uses full functional mode. Otherwise the port operates in limited functional mode.

Connection to a Loop Protect switch guarantees that the alternate agreement mechanism is implemented. This means the designated port can rely on receiving a response to its proposal regardless of the role of the connected port, which has two important implications. First, the designated port connected to a non-root port may transition to forwarding. Second, there is no ambiguity when a timeout happens; a Loop Protect event has occurred.

In full functional mode, when a type 2 BPDU is received and the port is designated and point-to-point, the timer is set to 3 times helloTime. In limited functional mode there is the additional requirement that the flags field indicate a root role. If the port is a boundary port the MSTIs for that port follow the CIST, that is, the MSTI port timers are set according to the CIST port timer. If the port is internal to the region then the MSTI port timers are set independently using the particular MSTI message.

Message age expiration and the expiration of the Loop Protect timer are both Loop Protect events. A notice level syslog message is produced for each such event. Traps may be configured to report these events as well. A syslog message and trap may be configured for disputed BPDUs.

It is also configurable to force the locking of a SID/port for the occurrence of one or more events. When the configured number of events happen within a given window of time, the port is forced into blocking and held there until it is manually unlocked via management.

Configuring Spanning Tree Bridge Parameters

Purpose

To display and set Spanning Tree bridge parameters, including device priorities, hello time, maximum wait time, forward delay, path cost, and topology change trap suppression.

Commands

For information about...	Refer to page...
show spantree stats	9-5
set spantree	9-7
show spantree version	9-7
set spantree version	9-8
clear spantree version	9-8
show spantree bpdu-forwarding	9-9
set spantree bpdu-forwarding	9-9
show spantree bridgeprioritymode	9-10
set spantree bridgeprioritymode	9-10
clear spantree bridgeprioritymode	9-11
show spantree mstilist	9-12
set spantree msti	9-12
clear spantree msti	9-13
show spantree mstmap	9-13
set spantree mstmap	9-14
clear spantree mstmap	9-14
show spantree vlanlist	9-15
show spantree mstcfgid	9-15
set spantree mstcfgid	9-16
clear spantree mstcfgid	9-16
set spantree priority	9-17
clear spantree priority	9-17
set spantree hello	9-18
clear spantree hello	9-18
set spantree maxage	9-19
clear spantree maxage	9-19
set spantree fwddelay	9-20
clear spantree fwddelay	9-21
show spantree backuproot	9-21
set spantree backuproot	9-22
clear spantree backuproot	9-22
show spantree tctrapsuppress	9-23
set spantree tctrapsuppress	9-23
clear spantree tctrapsuppress	9-24

For information about...	Refer to page...
set spantree protomigration	9-24
show spantree spanguard	9-25
set spantree spanguard	9-25
clear spantree spanguard	9-26
show spantree spanguardtimeout	9-27
set spantree spanguardtimeout	9-27
clear spantree spanguardtimeout	9-28
show spantree spanguardlock	9-28
clear/set spantree spanguardlock	9-29
show spantree spanguardtrapenable	9-29
set spanstree spanguardtrapenable	9-30
clear spanstree spanguardtrapenable	9-30
show spantree legacypathcost	9-31
set spantree legacypathcost	9-31
clear spantree legacypathcost	9-32

show spantree stats

Use this command to display Spanning Tree information for one or more ports.

Syntax

show spantree stats [**port** *port-string*] [**sid** *sid*] [**active**]

Parameters

port *port-string*	(Optional) Displays information for the specified port(s). For a detailed description of possible *port--string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
sid sid	(Optional) Displays information for a specific Spanning Tree identifier. If not specified, SID 0 is assumed.
active	(Optional) Displays information for ports that have received STP BPDUs since boot.

Defaults

If *port-string* is not specified, Spanning Tree information for all ports will be displayed.

If *sid* is not specified, information for Spanning Tree 0 will be displayed.

If **active** is not specified information for all ports will be displayed regardless of whether or not they have received BPDUs.

Mode

Switch command, read-only.

Example

This example shows how to display the device's Spanning Tree configuration:

```
B2(su)->show spantree stats

Spanning tree status         - enabled
Spanning tree instance       - 0
Designated Root MacAddr      - 00-e0-63-9d-c1-c8
Designated Root Priority     - 0
Designated Root Cost         - 10000
Designated Root Port         - lag.0.1
Root Max Age                 - 20 sec
Root Hello Time              - 2  sec
Root Forward Delay           - 15 sec
Bridge ID MAC Address        - 00-01-f4-da-5e-3d
Bridge ID Priority           - 32768
Bridge Max Age               - 20 sec
Bridge Hello Time            - 2  sec
Bridge Forward Delay         - 15 sec
Topology Change Count        - 7
Time Since Top Change        - 00 days 03:19:15
Max Hops                     - 20
```

Table 9-24 shows a detailed explanation of command output.

Table 9-24 show spantree Output Details

Output	What It Displays...
Spanning tree instance	Spanning Tree ID.
Spanning tree status	Whether Spanning Tree is enabled or disabled.
Designated Root MacAddr	MAC address of the designated Spanning Tree root bridge.
Designated Root Port	Port through which the root bridge can be reached.
Designated Root Priority	Priority of the designated root bridge.
Designated Root Cost	Total path cost to reach the root.
Root Max Age	Amount of time (in seconds) a BPDU packet should be considered valid.
Root Hello Time	Interval (in seconds) at which the root device sends BPDU (Bridge Protocol Data Unit) packets.
Root Forward Delay	Amount of time (in seconds) the root device spends in listening or learning mode.
Bridge ID MAC Address	Unique bridge MAC address, recognized by all bridges in the network.
Bridge ID Priority	Bridge priority, which is a default value, or is assigned using the **set spantree priority** command. For details, refer to "set spantree priority" on page 9-17.
Bridge Max Age	Maximum time (in seconds) the bridge can wait without receiving a configuration message (bridge "hello") before attempting to reconfigure. This is a default value, or is assigned using the **set spantree maxage** command. For details, refer to "set spantree maxage" on page 9-19.
Bridge Hello Time	Amount of time (in seconds) the bridge sends BPDUs. This is a default value, or is assigned using the **set spantree hello** command. For details, refer to "set spantree hello" on page 9-18.

Table 9-24 show spantree Output Details (Continued)

Output	What It Displays...
Bridge Forward Delay	Amount of time (in seconds) the bridge spends in listening or learning mode. This is a default value, or is assigned using the **set spantree fwddelay** command. For details, refer to "set spantree fwddelay" on page 9-20.
Topology Change Count	Number of times topology has changed on the bridge.
Time Since Top Change	Amount of time (in days, hours, minutes and seconds) since the last topology change.
Max Hops	Maximum number of hops information for a particular Spanning Tree instance may traverse (via relay of BPDUs within the applicable MST region) before being discarded.

set spantree

Use this command to globally enable or disable the Spanning Tree protocol on the switch.

Syntax

```
set spantree {disable | enable}
```

Parameters

disable | **enable**	Globally disables or enables Spanning Tree.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to disable Spanning Tree on the device:

```
B2(su)->set spantree disable
```

show spantree version

Use this command to display the current version of the Spanning Tree protocol running on the device.

Syntax

```
show spantree version
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display Spanning Tree version information for the device:

```
B2(su)->show spantree version
Force Version is mstp
```

set spantree version

Use this command to set the version of the Spanning Tree protocol to MSTP (Multiple Spanning Tree Protocol), RSTP (Rapid Spanning Tree Protocol) or to STP 802.1D-compatible.

Syntax

```
set spantree version {mstp | stpcompatible | rstp}
```

Parameters

mstp	Sets the version to STP 802.1s-compatible.
stpcompatible	Sets the version to STP 802.1D-compatible.
rstp	Sets the version to 802.1w-compatible.

Defaults

None.

Mode

Switch command, read-write.

Usage

In most networks, Spanning Tree version should not be changed from its default setting of **mstp** (Multiple Spanning Tree Protocol) mode. MSTP mode is fully compatible and interoperable with legacy STP 802.1D and Rapid Spanning Tree (RSTP) bridges. Setting the version to **stpcompatible** mode will cause the bridge to transmit only 802.1D BPDUs, and will prevent non-edge ports from rapidly transitioning to forwarding state.

Example

This example shows how to globally change the Spanning Tree version from the default of MSTP to RSTP:

```
B2(su)->set spantree version rstp
```

clear spantree version

Use this command to reset the Spanning Tree version to MSTP mode.

Syntax

```
clear spantree version
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the Spanning Tree version:

```
B2(su)->clear spantree version
```

show spantree bpdu-forwarding

Use this command to display the Spanning Tree BPDU forwarding mode.

Syntax

```
show spantree bpdu-forwarding
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the Spanning Tree BPDU forwarding mode:

```
B2(su)->show spantree bpdu-forwarding
BPDU forwarding is disabled.
```

set spantree bpdu-forwarding

Use this command to enable or disable Spanning Tree BPDU forwarding. By default BPDU forwarding is disabled.

Syntax

```
set spantree bpdu-forwarding {disable | enable}
```

Parameters

disable | **enable**	Disables or enables BPDU forwarding;.

Defaults

By default BPDU forwarding is disabled.

Mode

Switch command, read-write.

Usage

The Spanning Tree protocol must be disabled (set spantree **disable**) for this feature to take effect.

Example

This example shows how to enable BPDU forwarding:

```
B2(rw)-> set spantree bpdu-forwarding enable
```

show spantree bridgeprioritymode

Use this command to display the Spanning Tree bridge priority mode setting.

Syntax

show spantree bridgeprioritymode

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the Spanning Tree bridge priority mode setting:

```
B2(rw)->show spantree bridgeprioritymode
Bridge Priority Mode is set to IEEE802.1t mode.
```

set spantree bridgeprioritymode

Use this command to set the Spanning Tree bridge priority mode to 802.1D (legacy) or 802.1t.

Syntax

set spantree bridgeprioritymode {8021d | 8021t}

Parameters

8021d	Sets the bridge priority mode to use 802.1D (legacy) values, which are 0 - 65535.
8021t	Sets the bridge priority mode to use 802.1t values, which are 0 to 61440, in increments of 4096. Values will automatically be rounded up or down, depending on the 802.1t value to which the entered value is closest. This is the default bridge priority mode.

Defaults

None

Mode

Switch command, read-write.

Usage

The mode affects the range of priority values used to determine which device is selected as the Spanning Tree root as described in **set spantree priority** ("set spantree priority" on page 9-17). The default for the switch is to use 802.1t bridge priority mode.

Example

This example shows how to set the bridge priority mode to 802.1D:

```
B2(rw)->set spantree bridgeprioritymode 8021d
```

clear spantree bridgeprioritymode

Use this command to reset the Spanning Tree bridge priority mode to the default setting of 802.1t.

Syntax

```
clear spantree bridgeprioritymode
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the bridge priority mode to 802.1t:

```
B2(rw)->clear spantree bridgeprioritymode
```

show spantree mstilist

Use this command to display a list of Multiple Spanning Tree (MST) instances configured on the device.

Syntax

show spantree mstilist

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display a list of MST instances. In this case, SID 2 has been configured:

```
B2(su)->show spantree mstilist
 Configured Multiple Spanning Tree instances:
  2
```

set spantree msti

Use this command to create or delete a Multiple Spanning Tree instance.

Syntax

set spantree msti sid *sid* {**create | delete**}

Parameters

sid *sid*	Sets the Multiple Spanning Tree ID. Valid values are **1** - **4094**. SecureStack B2 devices will support up to 4 MST instances.
create | **delete**	Creates or deletes an MST instance.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to create an MST instance 2:

```
B2(su)->set spantree msti sid 2 create
```

clear spantree msti

Use this command to delete one or more Multiple Spanning Tree instances.

Syntax

clear spantree msti [**sid** *sid*]

Parameters

sid *sid*	(Optional) Deletes a specific multiple Spanning Tree ID.

Defaults

If *sid* is not specified, all MST instances will be cleared.

Mode

Switch command, read-write.

Example

This example shows how to delete all MST instances:

```
B2(su)->clear spantree msti
```

show spantree mstmap

Use this command to display the mapping of a filtering database ID (FID) to a Spanning Trees. Since VLANs are mapped to FIDs, this shows to which SID a VLAN is mapped.

Syntax

show spantree mstmap [**fid** *fid*]

Parameters

fid *fid*	(Optional) Displays information for specific FIDs.

Defaults

If *fid* is not specified, information for all assigned FIDs will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display SID to FID mapping information for FID 1. In this case, no new mappings have been configured:

```
B2(su)->show spantree mstmap fid 1
FID:       SID:
1          0
```

set spantree mstmap

Use this command to map one or more filtering database IDs (FIDs) to a SID. Since VLANs are mapped to FIDs, this essentially maps one or more VLAN IDs to a Spanning Tree (SID).

Note: Since any MST maps that are associated with GVRP-generated VLANs will be removed from the configuration if GVRP communication is lost, it is recommended that you only create MST maps on statically-created VLANs.

Syntax

set spantree mstmap *fid* [**sid** *sid*]

Parameters

fid	Specifies one or more FIDs to assign to the MST. Valid values are **1** - **4093**, and must correspond to a VLAN ID created using the **set vlan** command.
sid *sid*	(Optional) Specifies a Multiple Spanning Tree ID. Valid values are **1** - **4094**, and must correspond to a SID created using the **set msti** command.

Defaults

If *sid* is not specified, FID(s) will be mapped to Spanning Tree 0.

Mode

Switch command, read-write.

Example

This example shows how to map FID 3 to SID 2:

```
B2(su)->set spantree mstmap 3 sid 2
```

clear spantree mstmap

Use this command to map a FID back to SID 0.

Syntax

clear spantree mstmap *fid*

Parameters

fid	Specifies one or more FIDs to reset to 0.

Defaults

If *fid* is not specified, all SID to FID mappings will be reset.

Mode

Switch command, read-write.

Example

This example shows how to map FID 2 back to SID 0:

```
B2(su)->clear spantree mstmap 2
```

show spantree vlanlist

Use this command to display the Spanning Tree ID(s) assigned to one or more VLANs.

Syntax

show spantree vlanlist [*vlan-list*]

Parameters

vlan-list	(Optional) Displays SIDs assigned to specific VLAN(s).

Defaults

If not specified, SID assignment will be displayed for all VLANs.

Mode

Switch command, read-only.

Example

This example shows how to display the SIDs mapped to VLAN 1. In this case, SIDs 2, 16 and 42 are mapped to VLAN 1. For this information to display, the SID instance must be created using the **set spantree msti** command as described in "set spantree msti" on page 9-12, and the FIDs must be mapped to SID 1 using the **set spantree mstmap** command as described in "set spantree mstmap" on page 9-14:

```
B2(su)->show spantree vlanlist 1
 The following SIDS are assigned to VLAN 1: 2 16 42
```

show spantree mstcfgid

Use this command to display the MST configuration identifier elements, including format selector, configuration name, revision level, and configuration digest.

Syntax

show spantree mstcfgid

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the MST configuration identifier elements. In this case, the default revision level of 0, and the default configuration name (a string representing the bridge

MAC address) have not been changed. For information on using the **set spantree mstcfgid** command to change these settings, refer to "set spantree mstcfgid" on page 9-16:

```
B2(su)->show spantree mstcfgid
 MST Configuration Identifier:
  Format Selector: 0
  Configuration Name: 00:01:f4:89:51:94
  Revision Level: 0
  Configuration Digest: ac:36:17:7f:50:28:3c:d4:b8:38:21:d8:ab:26:de:62
```

set spantree mstcfgid

Use this command to set the MST configuration name and/or revision level.

Syntax

set spantree mstcfgid {**cfgname** *name* | **rev** *level*}

Parameters

cfgname *name*	Specifies an MST configuration name.
rev *level*	Specifies an MST revision level. Valid values are **0** - **65535**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the MST configuration name to "mstconfig":

```
B2(su)->set spantree mstconfigid cfgname mstconfig
```

clear spantree mstcfgid

Use this command to reset the MST revision level to a default value of 0, and the configuration name to a default string representing the bridge MAC address.

Syntax

clear spantree mstcfgid

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the MST configuration identifier elements to default values:

```
B2(su)->clear spantree mstcfgid
```

set spantree priority

Use this command to set the device's Spanning Tree priority.

Syntax

set spantree priority *priority* [*sid*]

Parameters

priority	Specifies the priority of the bridge. Valid values are from **0** to **61440 (**in increments of 4096**)**, with 0 indicating highest priority and 61440 lowest priority.
sid	(Optional) Sets the priority on a specific Spanning Tree. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If *sid* is not specified, priority will be set on Spanning Tree 0.

Mode

Switch command, read-write.

Usage

The device with the highest priority (lowest numerical value) becomes the Spanning Tree root device. If all devices have the same priority, the device with the lowest MAC address will then become the root device. Depending on the bridge priority mode (set with the **set spantree bridgeprioritymode** command described in "set spantree bridgeprioritymode" on page 9-10, some priority values may be rounded up or down.

Example

This example shows how to set the bridge priority to 4096 on SID 1:

```
B2(su)->set spantree priority 4096 1
```

clear spantree priority

Use this command to reset the Spanning Tree priority to the default value of 32768.

Syntax

clear spantree priority [*sid*]

Parameters

sid	(Optional) Resets the priority on a specific Spanning Tree. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If *sid* is not specified, priority will be reset on Spanning Tree 0.

Mode

Switch command, read-write.

Example

This example shows how to reset the bridge priority on SID 1:

```
B2(su)->clear spantree priority 1
```

set spantree hello

Use this command to set the device's Spanning Tree hello time, This is the time interval (in seconds) the device will transmit BPDUs indicating it is active.

Syntax

set spantree hello *interval*

Parameters

interval	Specifies the number of seconds the system waits before broadcasting a bridge hello message (a multicast message indicating that the system is active). Valid values are **1** - **10**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to globally set the Spanning Tree hello time to 10 seconds:

```
B2(su)->set spantree hello 10
```

clear spantree hello

Use this command to reset the Spanning Tree hello time to the default value of 2 seconds.

Syntax

clear spantree hello

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to globally reset the Spanning Tree hello time:

```
B2(su)->clear spantree hello
```

set spantree maxage

Use this command to set the bridge maximum aging time.

Syntax

set spantree maxage *agingtime*

Parameters

agingtime	Specifies the maximum number of seconds that the system retains the information received from other bridges through STP. Valid values are **6** - **40**.

Defaults

None.

Mode

Switch command, read-write.

Usage

The bridge maximum aging time is the maximum time (in seconds) a device can wait without receiving a configuration message (bridge "hello") before attempting to reconfigure. All device ports (except for designated ports) should receive configuration messages at regular intervals. Any port that ages out STP information provided in the last configuration message becomes the designated port for the attached LAN. If it is a root port, a new root port is selected from among the device ports attached to the network.

Example

This example shows how to set the maximum aging time to 25 seconds:

```
B2(su)->set spantree maxage 25
```

clear spantree maxage

Use this command to reset the maximum aging time for a Spanning Tree to the default value of 20 seconds.

Syntax

clear spantree maxage

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to globally reset the maximum aging time:

```
B2(su)->clear spantree maxage
```

set spantree fwddelay

Use this command to set the Spanning Tree forward delay.

Syntax

set spantree fwddelay *delay*

Parameters

delay	Specifies the number of seconds for the bridge forward delay. Valid values are **4** - **30**.

Defaults

None.

Mode

Switch command, read-write.

Usage

The forward delay is the maximum time (in seconds) the root device will wait before changing states (i.e., listening to learning to forwarding). This delay is required because every device must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that would make it return to a blocking state; otherwise, temporary data loops might result.

Example

This example shows how to globally set the bridge forward delay to 16 seconds:

```
B2(su)->set spantree fwddelay 16
```

clear spantree fwddelay

Use this command to reset the Spanning Tree forward delay to the default setting of 15 seconds.

Syntax

```
clear spantree fwddelay
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to globally reset the bridge forward delay:

```
B2(su)->clear spantree fwddelay
```

show spantree backuproot

Use this command to display the backup root status for an MST instance.

Syntax

show spantree backuproot [*sid*]

Parameters

sid	(Optional) Display backup root status for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If a SID is not specified, then status will be shown for Spanning Tree instance 0.

Mode

Switch command, read-only.

Example

This example shows how to display the status of the backup root function on SID 0:

```
B2(rw)->show spantree backuproot
Backup root is set to disable on sid 0
```

set spantree backuproot

Use this command to enable or disable the Spanning Tree backup root function on the switch.

Syntax

set spantree backuproot *sid* {disable | enable}

Parameters

sid	Specifies the Spanning Tree instance on which to enable or disable the backup root function.Valid values are **0** - **4094**.
disable | enable	Enables or disables the backup root function.

Defaults

None.

Mode

Switch command, read-write.

Usage

The Spanning Tree backup root function is disabled by default on the SecureStack B2. When this feature is enabled and the switch is directly connected to the root bridge, stale Spanning Tree information is prevented from circulating if the root bridge is lost. If the root bridge is lost, the backup root will dynamically lower its bridge priority so that it will be selected as the new root over the lost root bridge.

Example

This example shows how to enable the backup root function on SID 2:

```
B2(rw)->set spantree backuproot 2 enable
```

clear spantree backuproot

Use this command to reset the Spanning Tree backup root function to the default state of disabled.

Syntax

clear spantree backuproot *sid*

Parameters

sid	Specifies the Spanning Tree on which to clear the backup root function.Valid values are **0** - **4094**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the backup root function to disabled on SID 2:

```
B2(rw)->clear spantree backuproot 2
```

show spantree tctrapsuppress

Use this command to display the status of topology change trap suppression on Rapid Spanning Tree edge ports.

Syntax

```
show spantree tctrapsuppress
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the status of topology change trap suppression:

```
B2(rw)->show spantree tctrapsuppress
Topology change Trap Suppression is set to enabled
```

set spantree tctrapsuppress

Use this command to disable or enable topology change trap suppression on Rapid Spanning Tree edge ports.

Syntax

```
set spantree tctrapsuppress {disable | enable}
```

Parameters

disable | **enable**	Disables or enables topology change trap suppression.

Defaults

None.

Mode

Switch command, read-write.

Usage

By default, RSTP non-edge (bridge) ports that transition to forwarding or blocking cause the switch to issue a topology change trap. When topology change trap suppression is enabled, which is the device default, edge ports (such as end station PCs) are prevented from sending topology change traps. This is because there is usually no need for network management to monitor edge port STP transition states, such as when PCs are powered on. When topology change trap suppression is disabled, all ports, including edge and bridge ports, will transmit topology change traps.

Example

This example shows how to allow Rapid Spanning Tree edge ports to transmit topology change traps:

```
B2(rw)->set spantree tctrapsuppress disable
```

clear spantree tctrapsuppress

Use this command to clear the status of topology change trap suppression on Rapid Spanning Tree edge ports to the default state of enabled (edge port topology changes do not generate traps).

Syntax

`clear spantree tctrapsuppress`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear topology change trap suppression setting:

```
B2(rw)->clear spantree tctrapsuppress
```

set spantree protomigration

Use this command to reset the protocol state migration machine for one or more Spanning Tree ports. When operating in RSTP mode, this forces a port to transmit MSTP BPDUs.

Syntax

`set spantree protomigration` *<port-string>*

Parameters

port-string	Reset the protocol state migration machine for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the protocol state migration machine on port 20:

```
B2(su)->set spantree protomigration fe.1.20
```

show spantree spanguard

Use this command to display the status of the Spanning Tree SpanGuard function.

Syntax

```
show spantree spanguard
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the SpanGuard function status:

```
B2(su)->show spantree spanguard
Spanguard is disabled
```

set spantree spanguard

Use this command to enable or disable the Spanning Tree SpanGuard function.

Syntax

```
set spantree spanguard {enable | disable}
```

Parameters

enable | **disable**	Enables or disables the SpanGuard function.

Defaults

None.

Mode

Switch command, read-write.

Usage

SpanGuard is designed to disable, or lock out an "edge" port when an unexpected BPDU is received. The port can be configured to be re-enabled after a set time period, or only after manual intervention.

A port can be defined as an edge (user) port using the **set spantree adminedge** command, described in "set spantree adminedge" on page 9-39. A port designated as an edge port is expected to be connected to a workstation or other end-user type of device, and not to another switch in the network. When SpanGuard is enabled, if a non-loopback BPDU is received on an edge port, the Spanning Tree state of that port will be changed to "blocking" and will no longer forward traffic. The port will remain disabled until the amount of time defined by **set spantree spanguardtimeout** ("set spantree spanguardtimeout" on page 9-27) has passed since the last seen BPDU, the port is manually unlocked (**set** or **clear spantree spanguardlock**, "clear / set spantree spanguardlock" on page 9-29), the configuration of the port is changed so it is not longer an edge port, or the SpanGuard function is disabled.

SpanGuard is enabled and disabled only on a global basis (across the stack, if applicable). By default, SpanGuard is disabled and SpanGuard traps are enabled.

Example

This example shows how to enable the SpanGuard function:

```
B2(rw)->set spantree spanguard enable
```

clear spantree spanguard

Use this command to reset the status of the Spanning Tree SpanGuard function to disabled.

Syntax

```
clear spantree spanguard
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the status of the SpanGuard function to disabled:

```
B2(rw)->clear spantree spanguard
```

show spantree spanguardtimeout

Use this command to display the Spanning Tree SpanGuard timeout setting.

Syntax

show spantree spanguardtimeout

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the SpanGuard timeout setting:

```
B2(su)->show spantree spanguardtimeout
Spanguard timeout: 300
```

set spantree spanguardtimeout

Use this command to set the amount of time (in seconds) an edge port will remain locked by the SpanGuard function.

Syntax

set spantree spanguardtimeout *timeout*

Parameters

timeout	Specifies a timeout value in seconds. Valid values are **0** to **65535**. A value of 0 will keep the port locked until manually unlocked. The default value is 300 seconds.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the SpanGuard timeout to 600 seconds:

```
B2(su)->set spantree spanguardtimeout 600
```

clear spantree spanguardtimeout

Use this command to reset the Spanning Tree SpanGuard timeout to the default value of 300 seconds.

Syntax

clear spantree spanguardtimeout

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the SpanGuard timeout to 300 seconds:

```
B2(rw)->clear spantree spanguardtimeout
```

show spantree spanguardlock

Use this command to display the SpanGuard lock status of one or more ports.

Syntax

show spantree spanguardlock [*port-string*]

Parameters

port-string	(Optional) Specifies the port(s) for which to show SpanGuard lock status. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If no port string is specified, the SpanGuard lock status for all ports is displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the SpanGuard lock status for fe.1.1:

```
B2(su)->show spantree spanguardlock fe.1.1
Port fe.1.1 is Unlocked
```

clear / set spantree spanguardlock

Use either of these commands to unlock one or more ports locked by the Spanning Tree SpanGuard function. When SpanGuard is enabled, it locks ports that receive BPDUs when those ports have been defined as edge (user) ports (as described in "set spantree adminedge" on page 9-39).

Syntax

```
clear spantree spanguardlock port-string
set spantree spanguardlock port-string
```

Parameters

port-string	Specifies port(s) to unlock. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to unlock port `fe.1.16`:

```
B2(rw)->clear spantree spanguardlock fe.1.16
```

show spantree spanguardtrapenable

Use this command to display the state of the Spanning Tree SpanGuard trap function.

Syntax

```
show spantree spanguardtrapenable
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the state of the SpanGuard trap function:

```
B2(ro)->show spantree spanguardtrapenable
Spanguard SNMP traps are enabled
```

set spantree spanguardtrapenable

Use this command to enable or disable the sending of an SNMP trap message when SpanGuard has locked a port.

Syntax

set spantree spanguardtrapenable {**disable** | **enable**}

Parameters

disable | **enable**	Disables or enables sending SpanGuard traps. By default, sending traps is enabled.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to disable the SpanGuard trap function:

```
B2(su)->set spantree spanguardtrapenable disable
```

clear spantree spanguardtrapenable

Use this command to reset the Spanning Tree SpanGuard trap function back to the default state of enabled.

Syntax

clear spantree spanguardtrapenable

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the SpanGuard trap function to enabled:

```
B2(rw)->clear spantree spanguardtrapenable
```

show spantree legacypathcost

Use this command to display the default Spanning Tree path cost setting.

Syntax

```
show spantree legacypathcost
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the default Spanning Tree path cost setting.

```
B2(su)->show spantree legacypathcost
Legacy Path Cost is disabled.
```

set spantree legacypathcost

Use this command to enable or disable legacy (802.1D) path cost values.

Syntax

```
set spantree legacypathcost {disable | enable}
```

Parameters

disable	Use 802.1t2001 values to calculate path cost.
enable	Use 802.1d1998 values to calculate path cost.

Defaults

None.

Mode

Switch command, read-write.

Usage

By default, legacy path cost is disabled. Enabling the device to calculate legacy path costs affects the range of valid values that can be entered in the **set spantree adminpathcost** command.

Example

This example shows how to set the default path cost values to 802.1D.

```
B2(rw)->set spantree legacypathcost enable
```

clear spantree legacypathcost

Use this command to set the Spanning Tree default value for legacy path cost to 802.1t values.

Syntax

clear spantree legacypathcost

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears the legacy path cost to 802.1t values.

```
B2(rw)->clear spantree legacypathcost
```

Configuring Spanning Tree Port Parameters

Purpose

To display and set Spanning Tree port parameters.

Commands

For information about...	Refer to page...
set spantree portadmin	9-33
clear spantree portadmin	9-34
show spantree portadmin	9-34
show spantree portpri	9-35
set spantree portpri	9-35
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show spantree adminedge	9-38
set spantree adminedge	9-38
clear spantree adminedge	9-39

set spantree portadmin

Use this command to disable or enable the Spanning Tree algorithm on one or more ports.

Syntax

`set spantree portadmin` *`port-string`* **`{disable | enable}`**

Parameters

port-string	Specifies the port(s) for which to enable or disable Spanning Tree. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
disable | **enable**	Disables or enables Spanning Tree.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to disable Spanning Tree on fe.1.5:

```
B2(rw)->set spantree portadmin fe.1.5 disable
```

clear spantree portadmin

Use this command to reset the default Spanning Tree admin status to enable on one or more ports.

Syntax

clear spantree portadmin *port-string*

Parameters

port-string	Resets the default admin status on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the default Spanning Tree admin state to enable on fe.1.12:

```
B2(rw)->clear spantree portadmin fe.1.12
```

show spantree portadmin

Use this command to display the status of the Spanning Tree algorithm on one or more ports.

Syntax

show spantree portadmin [**port** *port-string]*

Parameters

port *port-string*	(Optional) Displays status for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, status will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display port admin status for `fe.1.1`:

```
B2(ro)->show spantree portadmin port fe.1.1
Port fe.1.1 has portadmin set to enabled
```

show spantree portpri

Use this command to show the Spanning Tree priority for one or more ports. Port priority is a component of the port ID, which is one element used in determining Spanning Tree port roles.

Syntax

show spantree portpri [**port** *port-string*] [**sid** *sid*]

Parameters

port *port-string*	(Optional) Specifies the port(s) for which to display Spanning Tree priority. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
sid *sid*	(Optional) Displays port priority for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If *port-string* is not specified, port priority will be displayed for all Spanning Tree ports.

If *sid* is not specified, port priority will be displayed for Spanning Tree 0.

Mode

Switch command, read-only.

Example

This example shows how to display the port priority for fe.2.7:

```
B2(su)->show spantree portpri port fe.2.7
Port fe.2.7 has a Port Priority of 128 on SID 0
```

set spantree portpri

Use this command to set a port's Spanning Tree priority.

Syntax

set spantree portpri *port-string priority* [**sid** *sid*]

Parameters

port-string	Specifies the port(s) for which to set Spanning Tree port priority. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
priority	Specifies a number that represents the priority of a link in a Spanning Tree bridge. Valid values are from **0** to **240 (in increments of 16)** with 0 indicating high priority.
sid *sid*	(Optional) Sets port priority for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If *sid* is not specified, port priority will be set for Spanning Tree 0.

Mode

Switch command, read-write.

Example

This example shows how to set the priority of fe.1.3 to 240 on SID 1

```
B2(su)->set spantree portpri fe.1.3 240 sid 1
```

clear spantree portpri

Use this command to reset the bridge priority of a Spanning Tree port to a default value of 128.

Syntax

clear spantree portpri *port-string* [**sid** *sid*]

Parameters

port-string	Specifies the port(s) for which to set Spanning Tree port priority. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
sid *sid*	(Optional) Resets the port priority for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 will be assumed.

Defaults

If *sid* is not specified, port priority will be set for Spanning Tree 0.

Mode

Switch command, read-write.

Example

This example shows how to reset the priority of fe.1.3 to 128 on SID 1

```
B2(su)->clear spantree portpri fe.1.3 sid 1
```

show spantree adminpathcost

Use this command to display the admin path cost for a port on one or more Spanning Trees.

Syntax

show spantree adminpathcost [**port** *port-string*] [**sid** *sid*]

Parameters

port *port-string*	(Optional) Displays the admin path cost value for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
sid *sid*	(Optional) Displays the admin path cost for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 will be assumed.

Defaults

If *port-string* is not specified, admin path cost for all Spanning Tree ports will be displayed.

If *sid* is not specified, admin path cost for Spanning Tree 0 will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the admin path cost for fe.3.4 on SID 1:

```
B2(su)->show spantree adminpathcost port fe.3.4 sid 1
Port fe.3.4 has a Port Admin Path Cost of 0 on SID 1
```

set spantree adminpathcost

Use this command to set the administrative path cost on a port and one or more Spanning Trees.

Syntax

set spantree adminpathcost *port-string cost* [**sid** *sid*]

Parameters

port-string	Specifies the port(s) on which to set an admin path cost. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
cost	Specifies the port path cost. Va1id values are **0** - **200000000**.
sid *sid*	(Optional) Sets the admin path cost for a specific Spanning Tree identifier. Valid values are **0** - **4094**. If not specified, SID 0 will be assumed.

Defaults

If *sid* is not specified, admin path cost will be set for Spanning Tree 0.

Mode

Switch command, read-write.

Example

This example shows how to set the admin path cost to 200 for fe.3.2 on SID 1:

```
B2(su)->set spantree adminpathcost fe.3.2 200 sid 1
```

clear spantree adminpathcost

Use this command to reset the Spanning Tree default value for port admin path cost to 0.

Syntax

clear spantree adminpathcost *port-string* [**sid** *sid*]

Parameters

port-string	Specifies the port(s) for which to reset admin path cost. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
sid *sid*	(Optional) Resets the admin path cost for specific Spanning Tree(s). Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If *sid* is not specified, admin path cost will be reset for Spanning Tree 0.

Mode

Switch command, read-write.

Example

This example shows how to reset the admin path cost to 0 for fe.3.2 on SID 1:

```
B2(su)->clear spantree adminpathcost fe.3.2 sid 1
```

show spantree adminedge

Use this command to display the edge port administrative status for a port.

Syntax

show spantree adminedge [port *port-string*]

Parameters

port-string	(Optional) Displays edge port administrative status for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified edge port administrative status will be displayed for all Spanning Tree ports.

Mode

Switch command, read-only.

Example

This example shows how to display the edge port status for fe.3.2:

```
B2(su)->show spantree adminedge port fe.3.2
Port fe.3.2 has a Port Admin Edge of Edge-Port
```

set spantree adminedge

Use this command to set the edge port administrative status on a Spanning Tree port.

Syntax

set spantree adminedge *port-string* **{true | false}**

Parameters

port-string	Specifies the edge port. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
true | **false**	Enables (**true**) or disables (**false**) the specified port as a Spanning Tree edge port.

Defaults

None.

Mode

Switch command, read-write.

Usage

The default behavior of the edge port administrative status begins with the value set to **false** initially after the device is powered up. If a Spanning Tree BDPU is not received on the port within a few seconds, the status setting changes to **true**.

Example

This example shows how to set fe.1.11 as an edge port:

```
B2(su)->set spantree adminedge fe.1.11 true
```

clear spantree adminedge

Use this command to reset a Spanning Tree port to non-edge status.

Syntax

clear spantree adminedge *port-string*

Parameters

port-string	Specifies port(s) on which to reset edge port status. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset fe.1.11 as a non-edge port:

```
B2(su)->clear spantree adminedge fe.1.11
```

Configuring Spanning Tree Loop Protect Parameters

Purpose

To display and set Spanning Tree Loop Protect parameters, including the global parameters of Loop Protect threshold, window, enabling traps, and disputed BPDU threshold, as well as per port and port/SID parameters. See "Loop Protect" on page 9-2 for more information about the Loop Protect feature.

Commands

For information about...	Refer to page...
set spantree lp	9-42
show spantree lp	9-42
clear spantree lp	9-43
show spantree lplock	9-43
clear spantree lplock	9-44
set spantree lpcapablepartner	9-45
show spantree lpcapablepartner	9-45
clear spantree lpcapablepartner	9-46
set spantree lpthreshold	9-46
show spantree lpthreshold	9-47
clear spantree lpthreshold	9-47
set spantree lpwindow	9-48
show spantree lpwindow	9-48
clear spantree lpwindow	9-49
set spantree lptrapenable	9-49
show spantree lptrapenable	9-50
clear spantree lptrapenable	9-50
set spantree disputedbpduthreshold	9-51
show spantree disputedbpduthreshold	9-52
clear spantree disputedbpduthreshold	9-52
show spantree nonforwardingreason	9-53

set spantree lp

Use this command to enable or disable the Loop Protect feature per port and optionally, per SID. The Loop Protect feature is disabled by default. See “Loop Protect” on page 2. for more information.

Syntax

set spantree lp *port-string* {**enable** | **disable**} [**sid** *sid*]

Parameters

port-string	Specifies port(s) on which to enable or disable the Loop Protect feature.
enable | **disable**	Enables or disables the feature on the specified port.
sid *sid*	(Optional) Enables or disables the feature for specific Spanning Tree(s). Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If no SID is specified, SID 0 is assumed.

Mode

Switch command, read-write.

Usage

Loop Protect takes precedence over per port STP enable/disable (portAdmin). Normally portAdmin disabled would cause a port to go immediately to forwarding. If Loop Protect is enabled, that port should go to listening and remain there.

Note: The Loop Protect enable/disable settings for an MSTI port should match those for the CIST port.

Example

This example shows how to enable Loop Protect on fe.2.3:

```
B2(su)->set spantree lp fe.1.11 enable
```

show spantree lp

Use this command to display the Loop Protect status per port and/or per SID.

Syntax

show spantree lp [**port** *port-string*] [**sid** *sid*]

Parameters

port-string	(Optional) Specifies port(s) for which to display the Loop Protect feature status.
sid *sid*	(Optional) Specifies the specific Spanning Tree(s) for which to display the Loop Protect feature status. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If no *port-string* is specified, status is displayed for all ports.

If no SID is specified, SID 0 is assumed.

Mode

Switch command, read-only.

Example

This example shows how to display Loop Protect status on fe.2.3:

```
B2(su)->show spantree lp port fe.2.3
LoopProtect is disabled on port fe.2.3    , SI
```

clear spantree lp

Use this command to return the Loop Protect status per port and optionally, per SID, to its default state of disabled.

Syntax

clear spantree lp *port-string* [**sid** *sid*]

Parameters

port-string	Specifies port(s) for which to clear the Loop Protect feature status.
sid *sid*	(Optional) Specifies the specific Spanning Tree(s) for which to clear the Loop Protect feature status. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If no SID is specified, SID 0 is assumed.

Mode

Switch command, read-write.

Example

This example shows how to return the Loop Protect state on fe.2.3 to disabled:

```
B2(rw)->clear spantree lp port fe.2.3
```

show spantree lplock

Use this command to display the Loop Protect lock status per port and/or per SID. A port can become locked if a configured number of Loop Protect events occur during the configured window of time. See the set spantree lpthreshold and set spantree lpwindow commands. Once a port is forced into blocking (locked), it remains locked until manually unlocked with the clear spantree lplock command.

Syntax

show spantree lplock [**port** *port-string*] [**sid** *sid*]

Parameters

port-string	(Optional) Specifies port(s) for which to display the Loop Protect lock status.
sid *sid*	(Optional) Specifies the specific Spanning Tree(s) for which to display the Loop Protect lock status. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If no *port-string* is specified, status is displayed for all ports.

If no SID is specified, SID 0 is assumed.

Mode

Switch command, read-only.

Example

This example shows how to display Loop Protect lock status on fe.1.1:

```
B2(rw)->show spantree lplock port fe.1.1
The LoopProtect lock status for port fe.1.1     , SID 0 is UNLOCKED
```

clear spantree lplock

Use this command to manually unlock a blocked port and optionally, per SID. The default state is unlocked.

Syntax

clear spantree lplock *port-string* [**sid** *sid*]

Parameters

port-string	Specifies port(s) for which to clear the Loop Protect lock.
sid *sid*	(Optional) Specifies the specific Spanning Tree(s) for which to clear the Loop Protect lock. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If no SID is specified, SID 0 is assumed.

Mode

Switch command, read-only.

Example

This example shows how to clear Loop Protect lock from fe.1.1:

```
B2(rw)->show spantree lplock port fe.1.1
The LoopProtect lock status for port fe.1.1     , SID 0 is LOCKED
B2(rw)->clear spantree lplock fe.1.1
B2(rw)->show spantree lplock port fe.1.1
The LoopProtect lock status for port fe.1.1     , SID 0 is UNLOCKED
```

set spantree lpcapablepartner

Use this command to specify per port whether the link partner is Loop Protect capable. See "Loop Protect" on page 2. for more information.

Syntax

set spantree lpcapablepartner *port-string* {**true** | **false**}

Parameters

port-string	Specifies port(s) for which to configure a Loop Protect capable link partner.
true | **false**	Specifies whether the link partner is capable (true) or not (false).

Defaults

None.

Mode

Switch command, read-write.

Usage

The default value for Loop Protect capable partner is false. If the port is configured with a Loop Protect capable partner (true), then the full functionality of the Loop Protect feature is used. If the value is false, then there is some ambiguity as to whether an Active Partner timeout is due to a loop protection event or is a normal situation due to the fact that the partner port does not transmit Alternate Agreement BPDUs. Therefore, a conservative approach is taken in that designated ports will not be allowed to forward unless receiving agreements from a port with root role.

This type of timeout will not be considered a loop protection event. Loop protection is maintained by keeping the port from forwarding but since this is not considered a loop event it will not be factored into locking the port.

Example

This example shows how to set the Loop Protect capable partner to true for fe.1.1:

```
B2(rw)->set spantree lpcapablepartner fe.1.1 true
```

show spantree lpcapablepartner

Use this command to the Loop Protect capability of a link partner for one or more ports.

Syntax

show spantree lpcapablepartner [**port** *port-string*]

Parameters

port-string	(Optional) Specifies port(s) for which to display Loop Protect capability for its link partner.

Defaults

If no *port-string* is specified, Loop Protect capability for link partners is displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display the Loop Protect partner capability for fe.1.1:

```
B2(rw)->show spantree lpcapablepartner port fe.1.1
Link partner of port fe.1.1 is not LoopProtect-capable
```

clear spantree lpcapablepartner

Use this command to reset the Loop Protect capability of port link partners to the default state of false.

Syntax

clear spantree lpcapablepartner *port-string*

Parameters

port-string	Specifies port(s) for which to clear their link partners' Loop Protect capability (reset to false).

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the Loop Protect partner capability for fe.1.1:

```
B2(rw)->clear spantree lpcapablepartner fe.1.1
```

set spantree lpthreshold

Use this command to set the Loop Protect event threshold.

Syntax

set spantree lpthreshold *value*

Parameters

value	Specifies the number of events that must occur during the event window in order to lock a port/SID. The default value is 3 events. A threshold of 0 specifies that ports will never be locked.

Defaults

None. The default event threshold is 3.

Mode

Switch command, read-write.

Usage

The LoopProtect event threshold is a global integer variable that provides protection in the case of intermittent failures. The default value is 3. If the event counter reaches the threshold within a given period (the event window), then the port, for the given SID, becomes locked (that is, held indefinitely in the blocking state). If the threshold is 0, the ports are never locked.

Example

This example shows how to set the Loop Protect threshold value to 4:

```
B2(rw)->set spantree lpthreshold 4
```

show spantree lpthreshold

Use this command to display the current value of the Loop Protect event threshold.

Syntax

`show spantree lpthreshold`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the current Loop Protect threshold value:

```
B2(rw)->show spantree lpthreshold
The Loop Protect event threshold value is 4
```

clear spantree lpthreshold

Use this command to return the Loop Protect event threshold to its default value of 3.

Syntax

`clear spantree lpthreshold`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the Loop Protect event threshold to the default of 3:

```
B2(rw)->clear spantree lpthreshold
```

set spantree lpwindow

Use this command to set the Loop Protect event window value in seconds.

Syntax

`set spantree lpwindow` *`value`*

Parameters

value	Specifies the number of seconds that comprise the period during which Loop Protect events are counted. The default event window is 180 seconds.

Defaults

None.

Mode

Switch command, read-write.

Usage

The Loop Protect Window is a timer value, in seconds, that defines a period during which Loop Protect events are counted. The default value is 180 seconds. If the timer is set to 0, the event counter is not reset until the Loop Protect event threshold is reached. If the threshold is reached, that constitutes a loop protection event.

Example

This example shows how to set the Loop Protect event window to 120 seconds:

```
B2(rw)->set spantree lpwindow 120
```

show spantree lpwindow

Use this command to display the current Loop Protect event window value.

Syntax

`show spantree lpwindow`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the current Loop Protect window value:

```
B2(rw)->show spantree lpwindow
The Loop Protect event window is set to 120 seconds
```

clear spantree lpwindow

Use this command to reset the Loop Protect event window to the default value of 180 seconds.

Syntax

clear spantree lpwindow

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the Loop Protect event window to the default of 180 seconds:

```
B2(rw)->clear spantree lpwindow
```

set spantree lptrapenable

Use this command to enable or disable Loop Protect event notification.

Syntax

set spantree lptrapenable {**enable** | **disable**}

Parameters

enable | **disable**	Enables or disables the sending of Loop Protect traps. Default is disabled.

Defaults

None.

Mode

Switch command, read-write.

Usage

Loop Protect traps are sent when a Loop Protect event occurs, that is, when a port goes to listening due to not receiving BPDUs. The trap indicates port, SID and loop protection status.

Example

This example shows how to enable sending of Loop Protect traps:

```
B2(rw)->set spantree lptrapenable enable
```

show spantree lptrapenable

Use this command to display the current status of Loop Protect event notification.

Syntax

`show spantree lptrapenable`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the current Loop Protect event notification status:

```
B2(rw)->show spantree lptrapenable
The Loop Protect event notification status is enable
```

clear spantree lptrapenable

Use this command to return the Loop Protect event notification state to its default state of disabled.

Syntax

`clear spantree lptrapenable`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the Loop Protect event notification state to the default of disabled.

```
B2(rw)->clear spantree lptrapenable
```

set spantree disputedbpduthreshold

Use this command to set the disputed BPDU threshold, which is the number of disputed BPDUs that must be received on a given port/SID until a disputed BPDU trap is sent.

Syntax

`set spantree disputedbpduthreshold` *`value`*

Parameters

value	Specifies the number of disputed BPDUs that must be received on a given port/SID to cause a disputed BPDU trap to be sent. A threshold of 0 indicates that traps should not be sent. The default value is 0.

Defaults

None.

Mode

Switch command, read-write.

Usage

A disputed BPDU is one in which the flags field indicates a designated role and learning, and the priority vector is worse than that already held by the port. If a disputed BPDU is received the port is forced to the listening state. Refer to the 802.1Q-2005 standard, *IEEE Standard for Local and Metropolitan Area Networks – Virtual Bridged Local Area Networks,* for a full description of the dispute mechanism, which prevents looping in cases of one-way communication.

The disputed BPDU threshold is an integer variable that represents the number of disputed BPDUs that must be received on a given port/SID until a disputed BPDU trap is sent and a syslog message is issued. For example, if the threshold is 10, then a trap is issued when 10, 20, 30, and so on, disputed BPDUs have been received.

If the value is 0, traps are not sent. The trap indicates port, SID and total Disputed BPDU count. The default is 0.

Example

This example shows how to set the disputed BPDU threshold value to 5:

```
B2(rw)->set spantree disputedbpduthreshold 5
```

show spantree disputedbpduthreshold

Use this command to display the current value of the disputed BPDU threshold.

Syntax

`show spantree disputedbpduthreshold`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the current disputed BPDU threshold:

```
B2(rw)->show spantree disputedbpduthreshold
The disputed BPDU threshold value is 0
```

clear spantree disputedbpduthreshold

Use this command to return the disputed BPDU threshold to its default value of 0, meaning that disputed BPDU traps should not be sent.

Syntax

`clear spantree disputedbpduthreshold`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the disputed BPDU threshold to the default of 0:

```
B2(rw)->clear spantree disputedbpduthreshold
```

show spantree nonforwardingreason

Use this command to display the reason for placing a port in a non-forwarding state due to an exceptional condition.

Syntax

show spantree nonforwardingreason *port-string* [**sid** *sid*]

Parameters

port-string	Specifies port(s) for which to display the non-forwarding reason.
sid *sid*	(Optional) Specifies the specific Spanning Tree(s) for which to display the non-forwarding reason. Valid values are **0** - **4094**. If not specified, SID 0 is assumed.

Defaults

If no *port-string* is specified, non-forwarding reason is displayed for all ports.

If no SID is specified, SID 0 is assumed.

Mode

Switch command, read-only.

Usage

Exceptional conditions causing a port to be placed in listening or blocking state include a Loop Protect event, receipt of disputed BPDUs, and loopback detection.

Example

This example shows how to display the non-forwarding reason on fe.1.1:

```
B2(rw)->show spantree nonforwardingreason port fe.1.1
The non-forwarding reason for port fe.1.1     on SID 0 is None
```

10

802.1Q VLAN Configuration

This chapter describes the SecureStack B2 system's capabilities to implement 802.1Q virtual LANs (VLANs).

For information about...	Refer to page...
VLAN Configuration Summary	10-1
Viewing VLANs	10-2
Creating and Naming Static VLANs	10-5
Assigning Port VLAN IDs (PVIDs) and Ingress Filtering	10-8
Configuring the VLAN Egress List	10-13
Setting the Host VLAN	10-18
Enabling/Disabling GVRP (GARP VLAN Registration Protocol)	10-20

VLAN Configuration Summary

Virtual LANs allow the network administrator to partition network traffic into logical groups and control the flow of that traffic through the network. Once the traffic and, in effect, the users creating the traffic, are assigned to a VLAN, then broadcast and multicast traffic is contained within the VLAN and users can be allowed or denied access to any of the network's resources. Also, some or all of the ports on the device can be configured as GVRP ports, which enable frames received with a particular VLAN ID and protocol to be transmitted on a limited number of ports. This keeps the traffic associated with a particular VLAN and protocol isolated from the other parts of the network.

Note: The device can support up to 1024 802.1Q VLANs. The allowable range for VLAN IDs is 1 to 4093. As a default, all ports on the device are assigned to VLAN ID 1, untagged.

Port String Syntax Used in the CLI

For information on how to designate VLANs and port numbers in the CLI syntax, refer to "Port String Syntax Used in the CLI" on page 7-2.

Creating a Secure Management VLAN

By default at startup, there is one VLAN configured on the SecureStack B2 device. It is VLAN ID 1, the DEFAULT VLAN. The default community name, which determines remote access for SNMP management, is set to "public" with read-write access.

If the SecureStack B2 device is to be configured for multiple VLANs, it may be desirable to configure a management-only VLAN. This allows a station connected to the management VLAN to manage the device. It also makes management secure by preventing configuration via ports assigned to other VLANs.

To create a secure management VLAN, you must:

Step	Task	Refer to page...
1.	Create a new VLAN.	10-5
2.	Set the PVID for the desired switch port to the VLAN created in Step 1.	10-9
3.	Add the desired switch port to the egress list for the VLAN created in Step 1.	10-15
4.	Assign host status to the VLAN.	10-18
5.	Set a private community name and access policy.	8-14

The commands used to create a secure management VLAN are listed in Table 10-25. This example assumes the management station is attached to fe.1.1 and wants untagged frames.

The process described here would be repeated on every device that is connected in the network to ensure that each device has a secure management VLAN.

Table 10-25 Command Set for Creating a Secure Management VLAN

To do this...	Use these commands...
Create a new VLAN and confirm settings.	**set vlan create 2** (“set vlan” on page 10-5)
	(Optional) **show vlan 2** (“show vlan” on page 10-3)
Set the PVID to the new VLAN.	**set port vlan fe.1.1 2** (“set port vlan” on page 10-9)
Add the port to the new VLAN’s egress list.	**set vlan egress 2 fe.1.1 untagged** (“set vlan egress” on page 10-15)
Remove the port from the default VLAN’s egress list.	**clear vlan egress 1 fe.1.1** (“clear vlan egress” on page 10-15)
Assign host status to the VLAN.	**set host vlan 2** (“set host vlan” on page 10-18)
Set a private community name and access policy and confirm settings.	**set snmp community private** (“set snmp community” on page 8-14)
	(Optional) **show snmp community** (“show snmp community” on page 8-13)

Viewing VLANs

Purpose

To display a list of VLANs currently configured on the device, to determine how one or more VLANs were created, the ports allowed and disallowed to transmit traffic belonging to VLAN(s), and if those ports will transmit the traffic with a VLAN tag included.

Command

For information about...	Refer to page...
show vlan	10-3

show vlan

Use this command to display all information related to one or more VLANs.

Syntax

show vlan [**static**] [*vlan-list*] [**portinfo** [**vlan** *vlan-list* | *vlan-name*] [**port** *port-string*]]

Parameters

static	(Optional) Displays information related to static VLANs. Static VLANs are manually created using the **set vlan** command ("set vlan" on page 10-5), SNMP MIBs, or the WebView management application. The default VLAN, VLAN 1, is always statically configured and can't be deleted. Only ports that use a specified VLAN as their default VLAN (PVID) will be displayed.
vlan-list	(Optional) Displays information for a specific VLAN or range of VLANs.
portinfo	(Optional) Displays VLAN attributes related to one or more ports.
vlan *vlan-list* | *vlan-name*	(Optional) Displays port information for one or more VLANs.
port *port-string*	(Optional) Displays port information for one or more ports.

Defaults

If no options are specified, all information related to static and dynamic VLANs will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display information for VLAN 1. In this case, VLAN 1 is named "DEFAULT VLAN". Ports allowed to transmit frames belonging to VLAN 1 are listed as egress ports. Ports that won't include a VLAN tag in their transmitted frames are listed as untagged ports. There are no forbidden ports (prevented from transmitted frames) on VLAN 1:

```
B2(su)->show vlan 1
 VLAN: 1         NAME: DEFAULT VLAN
 VLAN Type: Default
Egress Ports
fe.1.1-10, fe.2.1-4, fe.3.1-7,
 Forbidden Egress Ports
None.
 Untagged Ports
fe.1.1-10, fe.2.1-4, fe.3.1-7,
```

Table 10-26 provides an explanation of the command output.

Table 10-26 show vlan Output Details

Output Field	What It Displays...
VLAN	VLAN ID.
NAME	Name assigned to the VLAN.
Status	Whether it is **enabled** or **disabled**.
VLAN Type	Whether it is **permanent** (static) or **dynamic**.
Egress Ports	Ports configured to transmit frames for this VLAN.
Forbidden Egress Ports	Ports prevented from transmitting frames for this VLAN.
Untagged Ports	Ports configured to transmit untagged frames for this VLAN.

Creating and Naming Static VLANs

Purpose

To create a new static VLAN, or to enable or disable existing VLAN(s).

Commands

For information about...	Refer to page...
set vlan	10-5
set vlan name	10-6
clear vlan	10-6
clear vlan name	10-7

set vlan

Use this command to create a new static IEEE 802.1Q VLAN, or to enable or disable an existing VLAN.

Syntax

`set vlan {create | enable | disable}` *`vlan-list`*

Parameters

create | **enable** | **disable**	Creates, enables or disables VLAN(s).
vlan-list	Specifies one or more VLAN IDs to be created, enabled or disabled.

Defaults

None.

Mode

Switch command, read-write.

Usage

Once a VLAN is created, you can assign it a name using the **set vlan name** command described in "set vlan name" on page 10-6.

Each VLAN ID must be unique. If a duplicate VLAN ID is entered, the device assumes that the Administrator intends to modify the existing VLAN.

Enter the VLAN ID using a unique number between 1 and 4093. The VLAN IDs of 0 and 4094 and higher may not be used for user-defined VLANs.

Examples

This example shows how to create VLAN 3:

```
B2(su)->set vlan create 3
```

set vlan name

Use this command to set or change the ASCII name for a new or existing VLAN.

Syntax

set vlan name *vlan-list vlan-name*

Parameters

vlan-list	Specifies the VLAN ID of the VLAN(s) to be named.
vlan-name	Specifies the string used as the name of the VLAN (1 to 32 characters).

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the name for VLAN 7 to green:

```
B2(su)->set vlan name 7 green
```

clear vlan

Use this command to remove a static VLAN from the list of VLANs recognized by the device.

Syntax

clear vlan *vlan-list*

Parameters

vlan-list	Specifies the VLAN ID of the VLAN(s) to be removed.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to remove a static VLAN 9 from the device's VLAN list:

```
B2(su)->clear vlan 9
```

clear vlan name

Use this command to remove the name of a VLAN from the VLAN list.

Syntax

clear vlan name *vlan-list*

Parameters

vlan-list	Specifies the VLAN ID of the VLAN(s) for which the name will be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the name for VLAN 9:

```
B2(su)->clear vlan name 9
```

Assigning Port VLAN IDs (PVIDs) and Ingress Filtering

Purpose

To assign default VLAN IDs to untagged frames on one or more ports, to configure VLAN ingress filtering and constraints, and to set the frame discard mode.

Commands

For information about...	Refer to page...
show port vlan	10-8
set port vlan	10-9
clear port vlan	10-9
show port ingress filter	10-10
set port ingress filter	10-11
show port discard	10-11
set port discard	10-12

show port vlan

Use this command to display port VLAN identifier (PVID) information. PVID determines the VLAN to which all untagged frames received on one or more ports will be classified.

Syntax

show port vlan [*port-string*]

Parameters

port-string	(Optional) Displays PVID information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port -string* is not specified, port VLAN information for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display PVIDs assigned to fe.2.1 through 6. In this case, untagged frames received on these ports will be classified to VLAN 1:

```
B2(su)->show port vlan fe.2.1-6
fe.2.1 is set to 1
fe.2.2 is set to 1
fe.2.3 is set to 1
fe.2.4 is set to 1
```

```
fe.2.5 is set to 1
fe.2.6 is set to 1
```

set port vlan

Use this command to configure the PVID (port VLAN identifier) for one or more ports.

Syntax

`set port vlan` *`port-string pvid`* **`[modify-egress | no-modify-egress]`**

Parameters

port-string	Specifies the port(s) for which to configure a VLAN identifier. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
pvid	Specifies the VLAN ID of the VLAN to which port(s) will be added.
modify-egress	(Optional) Adds port(s) to VLAN's untagged egress list and removes them from other untagged egress lists.
no-modify-egress	(Optional) Does not prompt for or make egress list changes.

Defaults

None.

Mode

Switch command, read-write.

Usage

The PVID is used to classify untagged frames as they ingress into a given port.

Example

This example shows how to add `fe.1.10` to the port VLAN list of VLAN 4 (PVID 4).

```
B2(su)->set vlan create 4
B2(su)->set port vlan fe.1.10 4 modify-egress
```

clear port vlan

Use this command to reset a port's 802.1Q port VLAN ID (PVID) to the host VLAN ID 1.

Note: The following command will reset the specified port's egress status to tagged. To set the specified ports back to the default egress status of untagged, you must issue the **set port vlan** command as described on page 10-9.

Syntax

`clear port vlan` *`port-string`*

Parameters

port-string	Specifies the port(s) to be reset to the host VLAN ID 1. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset ports `fe.1.3` through 11 to a VLAN ID of 1 (Host VLAN):

```
B2(su)->clear port vlan fe.1.3-11
```

show port ingress filter

Use this command to show all ports that are enabled for port ingress filtering, which limits incoming VLAN ID frames according to a port VLAN egress list. If the VLAN ID specified in the received frame is not on the port's VLAN egress list, then that frame is dropped and not forwarded.

Syntax

`show port ingress-filter` [*`port-string`*]

Parameters

port-string	(Optional) Specifies the port(s) for which to display ingress filtering status. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, ingress filtering status for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the port ingress filter status for ports 10 through 15 in slot 1. In this case, the ports are disabled for ingress filtering:

```
B2(su)->show port ingress-filter fe.1.10-15
   Port      State
 --------  ---------
  fe.1.10  disabled
  fe.1.11  disabled
  fe.1.12  disabled
  fe.1.13  disabled
  fe.1.14  disabled
  fe.1.15  disabled
```

set port ingress filter

Use this command to discard all frames received with a VLAN ID that don't match the port's VLAN egress list.

Syntax

set port ingress-filter *port-string* {disable | enable}

Parameters

port-string	Specifies the port(s) on which to enable of disable ingress filtering. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
disable | **enable**	Disables or enables ingress filtering.

Defaults

None.

Mode

Switch command, read-write.

Usage

When ingress filtering is enabled on a port, the VLAN IDs of incoming frames are compared to the port's egress list. If the received VLAN ID does not match a VLAN ID on the port's egress list, then the frame is dropped.

Ingress filtering is implemented according to the IEEE 802.1Q standard.

Example

This example shows how to enable port ingress filtering on `fe.1.3`:

```
B2(su)->set port ingress-filter fe.1.3 enable
```

show port discard

Use this command to display the frame discard mode for one or more ports. Ports can be set to discard frames based on whether or not the frame contains a VLAN tag. They can also be set to discard both tagged and untagged frames, or neither.

Syntax

show port discard [*port-string*]

Parameters

port-string	(Optional) Displays the frame discard mode for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, frame discard mode will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display the frame discard mode for `fe.2.7`. In this case, the port has been set to discard all tagged frames:

```
B2(su)->show port discard fe.2.7
 Port         Discard Mode
------------  -------------
 fe.2.7         tagged
```

set port discard

Use this command to set the frame discard mode on one or more ports.

Syntax

`set port discard` *`port-string`* {**`tagged`** | **`untagged`** | **`both`** | **`none`**}

Parameters

port-string	Specifies the port(s) for which to set frame discard mode. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
tagged | **untagged** | **both** | **none**	• Tagged - Discard all incoming (received) tagged packets on the defined port(s). • Untagged - Discard all incoming untagged packets. • Both - All traffic will be discarded (tagged and untagged). • None - No packets will be discarded.

Defaults

None.

Mode

Switch command, read-write.

Usage

The options are to discard all incoming tagged frames, all incoming untagged frames, neither (essentially allow all traffic), or both (essentially discarding all traffic).

A common practice is to discard all tagged packet on user ports. Typically an Administrator does not want the end users defining what VLAN they use for communication.

Example

This example shows how to discard all tagged frames received on port `fe.3.3`:

```
B2(su)->set port discard fe.3.3 tagged
```

Configuring the VLAN Egress List

Purpose

To assign or remove ports on the egress list of a particular VLAN. This determines which ports on the switch will be eligible to transmit frames for a particular VLAN. For example, ports 1, 5, 7, 8 could be allowed to transmit frames belonging to VLAN 20 and ports 7,8, 9, 10 could be allowed to transmit frames tagged with VLAN 30 (a port can belong to multiple VLAN Egress lists). Note that the Port Egress list for ports 7 and 8 would contain both VLAN 20 and 30.

The port egress type for all ports can be set to tagged, forbidden, or untagged. In general, VLANs have no egress (except for VLAN 1) until they are configured by static administration, or through dynamic mechanisms such as GVRP.

Setting a port to forbidden prevents it from participating in the specified VLAN and ensures that any dynamic requests (either through GVRP or dynamic egress) for the port to join the VLAN will be ignored. Setting a port to untagged allows it to transmit frames without a tag header. This setting is usually used to configure a port connected to an end user device. Frames sent between VLAN aware switches are typically tagged.

The default VLAN defaults its egress to untagged for all ports.

Commands

For information about...	Refer to page...
show port egress	10-13
set vlan forbidden	10-14
set vlan egress	10-15
clear vlan egress	10-15
show vlan dynamicegress	10-16
set vlan dynamicegress	10-17

show port egress

Use this command to display the VLAN membership for one or more ports.

Syntax

show port egress [*port-string*]

Parameters

port-string	(Optional) Displays VLAN membership for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, VLAN membership will be displayed for all ports.

Mode

Switch command, read-write.

Example

This example shows you how to show VLAN egress information for `fe.1.1` through 3. In this case, all three ports are allowed to transmit VLAN 1 frames as tagged and VLAN 10 frames as untagged. Both are static VLANs:

```
B2(su)->show port egress fe.1.1-3
 Port      Vlan          Egress     Registration
Number      Id           Status       Status
--------------------------------------------------------
fe.1.1       1           tagged       static
fe.1.1      10         untagged       static
fe.1.2       1           tagged       static
fe.1.2      10         untagged       static
fe.1.3       1           tagged       static
fe.1.3      10         untagged       static
```

set vlan forbidden

Use this command to prevent one or more ports from participating in a VLAN. This setting instructs the device to ignore dynamic requests (either through GVRP or dynamic egress) for the port to join the VLAN.

Syntax

`set vlan forbidden` *`vlan-id port-string`*

Parameters

vlan-id	Specifies the VLAN for which to set forbidden port(s).
port-string	Specifies the port(s) to set as forbidden for the specified *vlan-id*.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows you how to set `fe.1.3` to forbidden for VLAN 6:

```
B2(su)->set vlan forbidden 6 fe.1.3
```

set vlan egress

Use this command to add ports to the VLAN egress list for the device, or to prevent one or more ports from participating in a VLAN. This determines which ports will transmit frames for a particular VLAN.

Syntax

`set vlan egress` *`vlan-list port-string`* [**`untagged | forbidden | tagged`**]

Parameters

vlan-list	Specifies the VLAN where a port(s) will be added to the egress list.
port-string	Specifies one or more ports to add to the VLAN egress list of the specified *vlan-list*. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
untagged | **forbidden** | **tagged**	(Optional) Adds the specified ports as: • **untagged** — Causes the port(s) to transmit frames without an IEEE 802.1Q header tag. • **forbidden** — Instructs the device to ignore dynamic requests (either through GVRP or dynamic egress) from the port(s) to join the VLAN and disallows egress on that port. • **tagged** — Causes the port(s) to transmit 802.1Q tagged frames.

Defaults

If **untagged, forbidden** or **tagged** is not specified, the port will be added to the VLAN egress list as tagged.

Mode

Switch command, read-write.

Examples

This example shows how to add `fe.1.5` through 10 to the egress list of VLAN 7. This means that these ports will transmit VLAN 7 frames as tagged:

```
B2(su)->set vlan egress 7 fe.1.5-10 untagged
```

This example shows how to forbid ports 13 through 15 in slot 1 from joining VLAN 7 and disallow egress on those ports:

```
B2(su)->set vlan egress 7 fe.1.13-15 forbidden
```

This example shows how to allow port 2 in slot 1 to transmit VLAN 7 frames as untagged:

```
B2(su)->set vlan egress 7 fe.1.2 untagged
```

clear vlan egress

Use this command to remove ports from a VLAN's egress list.

Note: The following command will reset the specified port's egress status to tagged. To set the specified ports back to the default egress status of untagged, you must issue the **set vlan egress** command as described on page 10-15.

Syntax

clear vlan egress *vlan-list port-string* [**forbidden**]

Parameters

vlan-list	Specifies the number of the VLAN from which a port(s) will be removed from the egress list.
port-string	Specifies one or more ports to be removed from the VLAN egress list of the specified *vlan-list*. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
forbidden	(Optional) Clears the forbidden setting from the specified port(s) and resets the port(s) as able to egress frames if so configured by either static or dynamic means.

Defaults

If **forbidden** is not specified, tagged and untagged settings will be cleared.

Mode

Switch command, read-write.

Examples

This example shows how to remove `fe.3.14` from the egress list of VLAN 9:

```
B2(su)->clear vlan egress 9 fe.3.14
```

This example shows how to remove all Ethernet ports in slot 2 from the egress list of VLAN 4:

```
B2(su)->clear vlan egress 4 fe.2.*
```

show vlan dynamicegress

Use this command to display the status of dynamic egress (enabled or disabled) for one or more VLANs.

Syntax

show vlan dynamicegress [*vlan-list*]

Parameters

vlan-list	(Optional) Displays dynamic egress status for specific VLAN(s).

Defaults

If *vlan-list* is not specified, the dynamic egress status for all VLANs will be displayed.

Mode

Switch command, read-write.

Example

This example shows how to display the dynamic egress status for VLANs 50-55:

```
B2(rw)->show vlan dynamicegress 50-55
VLAN 50 is disabled
VLAN 51 is disabled
VLAN 52 is disabled
VLAN 53 is enabled
VLAN 54 is enabled
VLAN 55 is enabled
```

set vlan dynamicegress

Use this command to administratively set the dynamic egress status for one or more VLANs.

Syntax

set vlan dynamicegress *vlan-list* **{enable | disable}**

Parameters

vlan-list	Specifies the VLANs by ID to enable or disable dynamic egress.
enable | **disable**	Enables or disables dynamic egress.

Defaults

None.

Mode

Switch command, read-write.

Usage

If dynamic egress is enabled for a particular VLAN, when a port receives a frame tagged with that VLAN's ID, the switch will add the receiving port to that VLAN's egress list. Dynamic egress is disabled on the SecureStack B2 by default.

For example, assume you have 20 AppleTalk users on your network who are mobile users (that is, use different ports every day), but you want to keep the AppleTalk traffic isolated in its own VLAN. You can create an AppleTalk VLAN with a VLAN ID of 55 with a classification rule that all AppleTalk traffic gets tagged with VLAN ID 55. Then, you enable dynamic egress for VLAN 55. Now, when an AppleTalk user plugs into port fe.3.5 and sends an AppleTalk packet, the switch will tag the packet to VLAN 55 and also add port fe.3.5 to VLAN 55's egress list, which allows the AppleTalk user to receive AppleTalk traffic.

Example

This example shows how to enable dynamic egress on VLAN 55:

```
B2(rw)->set vlan dynamicegress 55 enable
```

Setting the Host VLAN

Purpose

To configure a host VLAN that only select devices are allowed to access. This secures the host port for management-only tasks.

Note: The host port is the management entity of the device. Refer to “Creating a Secure Management VLAN” on page 10-1 for more information.

Commands

For information about...	Refer to page...
show host vlan	10-18
set host vlan	10-18
clear host vlan	10-19

show host vlan

Use this command to display the current host VLAN.

Syntax

show host vlan

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the host VLAN:

```
B2(su)->show host vlan
  Host vlan is 7.
```

set host vlan

Use this command to assign host status to a VLAN.

Syntax

set host vlan *vlan-id*

Parameters

vlan-id	Specifies the number of the VLAN to set as the host VLAN.

Defaults

None.

Mode

Switch command, read-write.

Usage

The host VLAN should be a secure VLAN where only designated users are allowed access. For example, a host VLAN could be specifically created for device management. This would allow a management station connected to the management VLAN to manage all ports on the device and make management secure by preventing management via ports assigned to other VLANs.

Note: Before you can designate a VLAN as the host VLAN, you must create a VLAN using the set of commands described in "Creating and Naming Static VLANs" on page 10-5.

Example

This example shows how to set VLAN 7 as the host VLAN:

```
B2(su)->set host vlan 7
```

clear host vlan

Use this command to reset the host VLAN to the default setting of 1.

Syntax

```
clear host vlan
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the host VLAN to the default setting:

```
B2(su)->clear host vlan
```

Enabling/Disabling GVRP (GARP VLAN Registration Protocol)

About GARP VLAN Registration Protocol (GVRP)

The following sections describe the device operation when its ports are operating under the Generic Attribute Registration Protocol (GARP) application – GARP VLAN Registration Protocol (GVRP).

Overview

The purpose of GVRP is to dynamically create VLANs across a switched network. When a VLAN is declared, the information is transmitted out GVRP configured ports on the device in a GARP formatted frame using the GVRP multicast MAC address. A switch that receives this frame, examines the frame, and extracts the VLAN IDs. GVRP then creates the VLANs and adds the receiving port to its tagged member list for the extracted VLAN ID (s). The information is then transmitted out the other GVRP configured ports of the device. Figure 10-1 shows an example of how VLAN blue from end station A would be propagated across a switch network.

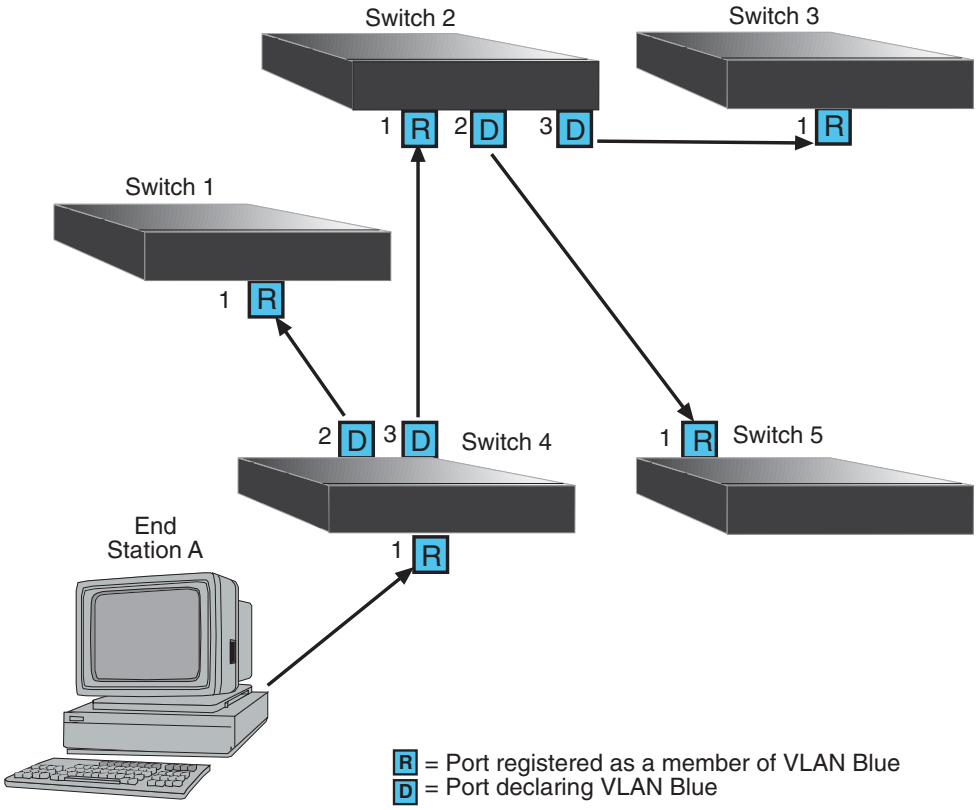
How It Works

In Figure 10-1 on page 10-21, Switch 4, port 1 is registered as being a member of VLAN Blue and then declares this fact out all its ports (2 and 3) to Switch 1 and Switch 2. These two devices register this in the port egress lists of the ports (Switch 1, port 1 and Switch 2, port 1) that received the frames with the information. Switch 2, which is connected to Switch 3 and Switch 5 declares the same information to those two devices and the port egress list of each port is updated with the new information, accordingly.

Configuring a VLAN on an 802.1Q switch creates a static VLAN entry. The entry will always remain registered and will not time out. However, dynamic entries will time-out and their registrations will be removed from the member list if the end station A is removed. This ensures that, if switches are disconnected or if end stations are removed, the registered information remains accurate.

The end result is that the port egress list of a port is updated with information about VLANs that reside on that port, even if the actual station on the VLAN is several hops away.

Figure 10-1 Example of VLAN Propagation via GVRP



Purpose

To dynamically create VLANs across a switched network. The GVRP command set is used to display GVRP configuration information, the current global GVRP state setting, individual port settings (enable or disable) and timer settings. By default, GVRP is enabled globally on the device, but disabled on all ports.

Commands

For information about...	Refer to page...
show gvrp	10-22
show garp timer	10-22
set gvrp	10-23
clear gvrp	10-24
set garp timer	10-24

show gvrp

Use this command to display GVRP configuration information.

Syntax

show gvrp [*port-string*]

Parameters

port-string	(Optional) Displays GVRP configuration information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, GVRP configuration information will be displayed for all ports and the device.

Mode

Switch command, read-only.

Example

This example shows how to display GVRP status for the device and for fw.2.1:

```
B2(su)->show gvrp fe.2.1
Global GVRP status is enabled.

Port Number    GVRP status
-----------    -----------
fe.2.1         disabled
```

show garp timer

Use this command to display GARP timer values for one or more ports.

Syntax

show garp timer [*port-string*]

Parameters

port-string	(Optional) Displays GARP timer information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, GARP timer information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display GARP timer information on ports 1 through 10 in slot 1:

Note: For a functional description of the terms **join**, **leave**, and **leaveall timers**, refer to the standard IEEE 802.1Q documentation, which is not supplied with this device.

```
B2(su)->show garp timer fe.1.1-10
 Port based GARP Configuration: (Timer units are centiseconds)
 Port Number     Join        Leave     Leaveall
 -----------  ----------  ----------  ----------
 fe.1.1             20          60        1000
 fe.1.2             20          60        1000
 fe.1.3             20          60        1000
 fe.1.4             20          60        1000
 fe.1.5             20          60        1000
 fe.1.6             20          60        1000
 fe.1.7             20          60        1000
 fe.1.8             20          60        1000
 fe.1.9             20          60        1000
 fe.1.10            20          60        1000
```

Table 10-27 provides an explanation of the command output. For details on using the **set gvrp** command to enable or disable GVRP, refer to "set gvrp" on page 10-23. For details on using the **set garp timer** command to change default timer values, refer to "set garp timer" on page 10-24.

Table 10-27 show gvrp configuration Output Details

Output Field	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
Join	Join timer setting.
Leave	Leave timer setting.
Leaveall	Leavall timer setting.

set gvrp

Use this command to enable or disable GVRP globally on the device or on one or more ports.

Syntax

`set gvrp {enable | disable}` [*`port-string`*]

Parameters

disable | **enable**	Disables or enables GVRP on the device.
port-string	(Optional) Disables or enables GVRP on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, GVRP will be disabled or enabled for all ports.

Mode

Switch command, read-write.

Examples

This example shows how to enable GVRP globally on the device:

```
B2(su)->set gvrp enable
```

This example shows how to disable GVRP globally on the device:

```
B2(su)->set gvrp disable
```

This example shows how to enable GVRP on `fe.1.3`:

```
B2(su)->set gvrp enable fe.1.3
```

clear gvrp

Use this command to clear GVRP status or on one or more ports.

Syntax

`clear gvrp` [*`port-string`*]

Parameters

port-string	(Optional) Clears GVRP status on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, GVRP status will be cleared for all ports.

Mode

Switch command, read-write.

Example

This example shows how to clear GVRP status globally on the device:

```
B2(su)->clear gvrp
```

set garp timer

Use this command to adjust the values of the join, leave, and leaveall timers.

Syntax

`set garp timer` {[**`join`** *`timer-value`*] [**`leave`** *`timer-value`*] [**`leaveall`** *`timer-value`*]} *`port-string`*

Parameters

join timer-value	Sets the GARP join timer in centiseconds (Refer to 802.1Q standard.)
leave timer-value	Sets the GARP leave timer in centiseconds (Refer to 802.1Q standard.)

leaveall timer-value	Sets the GARP leaveall timer in centiseconds (Refer to 802.1Q standard.)
port-string	Specifies the port(s) on which to configure GARP timer settings. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Usage

The setting of these timers is critical and should only be changed by personnel familiar with the 802.1Q standards documentation, which is not supplied with this device.

Examples

This example shows how to set the GARP join timer value to 100 centiseconds for all ports:

```
B2(su)->set garp timer join 100 *.*.*
```

This example shows how to set the leave timer value to 300 centiseconds for all ports:

```
B2(su)->set garp timer leave 300 *.*.*
```

This example shows how to set the leaveall timer value to 20000 centiseconds for all ports:

```
B2(su)->set garp timer leaveall 20000 *.*.*
```

11

Differentiated Services Configuration

This chapter describes the Differentiated Services (Diffserv) set of commands and how to use them.

Note: Diffserv will not be available if a Policy License is activated on the SecureStack B2. When a Policy License is activated, it enables Policy that takes the place of Diffserv. Refer to the chapter entitiled “Activating Licensed Features” for more information on Licensing.

SecureStack B2 devices support Diffserv policy-based provisioning of network resources by allowing IT administrators to:

- Create, change or remove Diffserv policies based on business-specific use of network services.
- Prioritize and police traffic according to assigned policies and conditions.
- Assign or unassign ports to Diffserv policies so that only ports activated for a policy will be allowed to transmit frames accordingly.

For information about ...	Refer to page ...
Globally Enabling or Disabling Diffserv	11-2
Creating Diffserv Classes and Matching Conditions	11-3
Configuring Diffserv Policies and Assigning Classes	11-9
Assigning Policies to Service Ports	11-14
DiffServ Configuration Examples	11-17

Note: The configuration of DiffServ rules is contingent on the order in which they are configured. Please review this entire chapter for a thorough explanation of the steps required to correctly configure this functionality.

Globally Enabling or Disabling Diffserv

Purpose

To globally enable or disable Diffserv on the device.

Command

For information about...	Refer to page...
set diffserv adminmode	11-2

set diffserv adminmode

Use this command to globally enable or disable Diffserv on the device. By default, this function is disabled at device startup.

Syntax

```
set diffserv adminmode {enable | disable}
```

Parameters

enable | **disable**	Enables or disables Diffserv.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable Diffserv:

```
B2(rw)->set diffserv adminmode enable
```

Creating Diffserv Classes and Matching Conditions

Purpose

To review, create, and configure Diffserv classes and matching conditions.

Commands

For information about...	Refer to page...
show diffserv info	11-3
show diffserv class	11-4
set diffserv class create	11-4
set diffserv class delete	11-5
set diffserv class match	11-5
set diffserv class rename	11-8

show diffserv info

Use this command to display general Diffserv status information.

Syntax

`show diffserv info`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display general Diffserv status information:

```
B2(rw)->show diffserv info

DiffServ Admin Mode............................ Enable
Class Table Size Current/Max................... 0 / 25
Class Rule Table Size Current/Max.............. 0 / 150
Policy Table Size Current/Max.................. 0 / 12
Policy Instance Table Size Current/Max......... 0 / 120
Policy Attribute Table Size Current/Max........ 0 / 120
Service Table Size Current/Max................. 0 / 48
```

show diffserv class

Use this command to display information about Diffserv classes.

Syntax

show diffserv class {**summary** | **detailed** *classname*}

Parameters

summary	Displays a summary of Diffserv class information.
detailed *classname*	Displays detailed Diffserv information for a specific class.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display a summary of Diffserv class information. In this case, there are two classes configured, named “guest” and “admin”:

```
B2(rw)->show diffserv class summary

Class Name           Class Type           Ref Class Name
---------------- ------------ ------------------------------
guest                All
admin                All
```

set class create

Use this command to create a new Diffserv class.

Syntax

set diffserv class create {**all** *classname}*

Parameters

all	Specifies that all match conditions must be met before the associated policy is executed.
classname	Specifies a class name for this new Diffserv class.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to create a Diffserv class called “admin”:

```
B2(rw)->set diffserv class create all admin
```

set diffserv class delete

Use this command to delete a Diffserv class and remove any match assigned to the class.

Syntax

set diffserv class delete *classname*

Parameters

classname	Specifies the class name to be deleted.

Defaults

None.

Mode

Switch command, read-write.

Usage

You cannot use this command to delete a class that has been assigned to a policy. Before deleting a class with an assigned policy and service port(s), you must first:

- Remove the service port(s) assigned to the policy using the **set diffserv service remove** command (page 11-16), then
- Remove the specified class using the **set diffserv policy class remove** command (page 11-11).

Example

This example shows how to delete the Diffserv “admin” class:

```
B2(rw)->set diffserv class delete admin
```

set diffserv class match

Use this command to match a Diffserv class to a service condition based on layer 2, 3, and 4 packet parameters.

set diffserv class match {[**every** *classname*] [**dstmac** | **scrmac** *classname macaddr macmask*] [**dstip** | **srcip** *classname ipaddr ipmask*] [**dstl4port** | **srcl4port**{**keyword** *classname keyword* | **number** *classname portnumber*}] [**ipdscp** *classname dscpval]* [**ipprecedence** *classname precedencenumber*] [**iptos** *classname tosbits tosmask*] [**protocol** {**keyword** *classname protocol-name* | **number** *classname protocol-number*}] [**refclass** {**add** | **remove**}{*classname refclassname*}] [**vlan** *classname vlanid*]}

Parameters

every *classname*	Matches all packets to a specific class.
dstmac | **scrmac** *classname macaddr macmask*	Matches to a specific class based on destination or source MAC address.
dstip | **srcip** *classname ipaddr ipmask*	Matches to a specific class based on destination or source IP address.
dstl4port | **srcl4port keyword** *classname keyword* | **number** *classname portnumber*	Matches to a specific class based on destination or source layer 4 port number or keyword. Valid *keyword* values are: • **domain** • **echo** • **ftp** • **ftpdata** • **http** • **smtp** • **snmp** • **telnet** • **tftp** • **www** Valid *portnumber* values are **0** - **65535**.
ipdscp *classname dscpval*	Matches to a specific class based on the value of the IP Diffserv Code Point. Valid numeric or keyword values can be entered as listed in Table 11-28 below.
ipprecedence *classname precedencenumber*	Matches to a specific class based on the value of the IP precedence field. Valid *precedencenumber* values are: **0** - **7**.
iptos *classname tosbits tosmask*	Matches to a specific class based on the value of the IP type of service (TOS) field. Valid *tosbits* values are **0** - **255**. Valid *tosmask* values are **1** - **8**.
protocol keyword *classname protocol-name* | **number** *classname protocol-number*	Matches to a specific class based on number or keyword in the IP protocol field. Valid *protocol-name* keyword are: • **icmp** • **igmp** • **ip** • **tcp** • **udp** Valid *protocol-number* values are **0** - **255**.
refclass add | **remove** *classname refclassname*	Adds or removes a set of already defined match conditions to a specific class.
vlan *classname vlanid*	Matches to a specific class based on VLAN ID. Valid values are **1**-**4094**.

Table 11-28 Valid IP DSCP Numeric and Keyword Values

Code Point Map	Numeric Value	Keyword (Usage)
b'000000	**0**	**be** (best effort)
b'xxx000	**0,8,16,24,32,40,48,56**	**cs0** - **cs7** (Class Selector PHB)
b'001xx0	**10,12,14**	**af11**, **af12**, **af13** (Assured Forwarding)
b'010xx0	**18,20,22**	**af21**, **af22**, **af23** (Assured Forwarding)
b'011xx0	**26,28,30**	**af31**, **af32**, **af33** (Assured Forwarding)
b'100xx0	**34,36,38**	**af41**, **af42**, **af43** (Assured Forwarding)
b'101110	**46**	**ef** (Expedited Forwarding)

Defaults

None.

Mode

Switch command, read-write.

Usage

Any policy that is applied must be composed of rules that come from only one of the following four groups.

- Layer 3:
  - Destination IP address (**dstip**)
  - Destination Layer 4 port (**dstl4port**)
  - IP Diffserv Code Point (**ipdscp**)
  - IP precedence field (**ipprecedence)**
  - IP type of service (TOS) field (**iptos)**
  - IP protocol field (**protocol)**
  - Source IP address (**srcip)**
  - Source Layer 4 port (**srcl4port)**
- Layer 2:
  - Destination MAC address (**dstmac)**
  - Source MAC address (**scrmac)**
  - VLAN ID (**vlan)**
- Layer 2 Layer 3 source:
  - Source MAC address (**scrmac)**
  - Source IP address (**srcip)**
  - VLAN ID (**vlan)**
- Layer 2 Layer 3 destination:
  - Destination MAC address (**dstmac)**

- Destination IP address (**dstip**)
- VLAN ID (**vlan)**

Note: The match type **every** will work with any group.

You cannot create and add a class to a policy before adding any rules (match conditions) to the class. Once a class is added to a policy, you cannot add any more rules (match conditions) to the class. You cannot create outbound policies.

You can only add rules that fit into the same category (shown in the groupings above) to a class. For example, if you create a class and add the match conditions **dstip** and **dstl4port**, you will only be able to add other rules from the L3 group.

Class matches of layer 4 destination or source must be sequenced before the corresponding protocol match, as illustrated in the third example below.

You can only add classes of the same category to a policy.

Examples

This example shows how to match the “admin” class to source IP address 130.10.0.32 and only that IP address type:

```
B2(rw)->set diffserv class match srcip admin 130.10.0.32 255.255.255.255
```

This example shows how to match the “admin” class to VLAN 10:

```
B2(rw)->set diffserv class match vlan admin 10
```

This example shows how to match the "http" class to TCP packets with a destination port of 80 (HTTP). The layer 4 port match must precede the protocol type.

```
B2(rw)->set diffserv class match dstl4port keyword http http
B2(rw)->set diffserv class match protocol keyword http tcp
```

set diffserv class rename

Use this command to change the name of a Diffserv class.

Syntax

`set diffserv class rename` *`classname newclassname`*

Parameters

classname	Specifies the class name previously set for this new Diffserv class.
newclassname	Specifies a new class name.

Defaults

None.

Mode

Switch command, Read-Write.

Example

This example shows how to rename the Diffserv "admin" class to "system":

```
B2(rw)->set diffserv class rename admin system
```

Configuring Diffserv Policies and Assigning Classes

Purpose

To review, create, and configure Diffserv policies and assign classes.

Commands

For information about...	Refer to page...
show diffserv policy	11-9
set diffserv policy create	11-10
set diffserv policy delete	11-10
set diffserv policy class	11-11
set diffserv policy mark	11-11
set diffserv policy police style simple	11-12
set diffserv policy police action conform	11-13
set diffserv policy police action nonconform	11-13
set diffserv policy rename	11-14

show diffserv policy

Use this command to display information about Diffserv policies.

Syntax

show diffserv policy {**summary** | **detailed** *policyname*}

Parameters

summary	Displays Diffserv policy summary information.
detailed *policyname*	Displays detailed Diffserv information for a specific policy.

Defaults

None.

Mode

Switch command. Read-Only.

Example

This example shows how to display a summary of Diffserv policy information. In this case, there is one policy named "admin", to which members of the "admin" class have been assigned. This policy is applied to incoming traffic on its assigned service ports:

```
B2(rw)->show diffserv policy summary

Policy Name           Policy Type          Class Members
--------------------- ----------- ------------------------------
admin                 In                   admin
```

set diffserv policy create

Use this command to create a new Diffserv policy.

Syntax

set diffserv policy create *policyname* {**in**}

Parameters

policyname	Specifies a policy name.
in	Applies this policy to incoming packets.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to create a Diffserv policy called "admin" and apply it to incoming packets:

```
B2(rw)->set diffserv policy create admin in
```

set diffserv policy delete

Use this command to delete a Diffserv policy.

Syntax

set diffserv policy delete *policyname*

Parameters

policyname	Specifies a policy name to be deleted.

Defaults

None.

Mode

Switch command, read-write.

Usage

In order to delete a policy you must first remove the service port(s) assigned to the policy using the **set diffserv service remove** command as described in "set diffserv service" on page 11-16.

Example

This example shows how to delete the Diffserv "admin" policy:

```
B2(rw)->set diffserv policy delete admin
```

set diffserv policy class

Use this command to add or remove a Diffserv class to a specified policy. Once added, policies will be active for the specified class.

Syntax

set diffserv policy class {**add** | **remove**} *policyname classname*

Parameters

add | **remove**	Adds or removes the specified class.
policyname	Specifies the policy name to be associated with the class.
classname	Specifies a class name to add or remove.

Defaults

None.

Mode

Switch command, read-write.

Usage

Class must be added to a policy using this command before policy parameters, such as bandwidth, marking, and policing, can be configured.

Example

This example shows how to add the "system" class to the "admin" policy:

```
B2(rw)->set diffserv policy class add admin system
```

set diffserv policy mark

Use this command to mark all packets for the associated Diffserv traffic stream with a specific IP DSCP or IP precedence value.

Syntax

set diffserv policy mark {**ipdscp** | **ipprecedence** *policyname classname value*}

Parameters

ipdscp | **ipprecedence**	Specifies that packets will be marked with either an IP DSCP or precedence value.
policyname	Specifies the policy name being configured.
classname	Specifies a Diffserv class to associate to this policy.
value	Specifies an IP DSCP or precedence value. Valid numeric or keyword DCSP values can be entered as listed in Section 11-28. Valid precedence values are: **0** - **7**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to mark packets matching the "admin" policy in the "system" class for DSCP expedited forwarding precedence:

```
B2(rw)->set diffserv policy mark ipdscp admin system ef
```

set diffserv policy police style simple

Use this command to establish the policing style for a Diffserv policy based only on bandwidth for the specified class.

Syntax

set diffserv policy police style simple *policyname classname bandwidth burstsize*

Parameters

policyname	Specifies the policy name being configured.
classname	Specifies a Diffserv class to associate to this policy.
bandwidth	Specifies a bandwidth value in Kbps. Valid values are **1** - **4294967295**.
burstsize	Specifies a burst size value im Kbytes. Valid values are **1** - **128**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to configure a bandwidth-based policing style for the "admin" Diffserv policy:

```
B2(rw)->set diffserv policy police style simple admin system 1000 128
```

set diffserv policy police action conform

Use this command to configure traffic policing actions for packets that conform to associated Diffserv classifications.

Syntax

set diffserv policy police action conform {**drop** | **send** *policyname classname}* | {**markdscp** | **markprec** *policyname classname value}*

Parameters

drop | **send**	Specifies whether the policing action for packets conforming to the classification parameters will be to drop or send packets.
policyname	Specifies the policy name being configured.
classname	Specifies a Diffserv class to associate to this policing action.
markdscp | **markprec**	Specifies a policing action based on IP DHCP or precedence.
value	Specifies an IP DHCP or precedence value set with the **set diffserv policy mark** command (page 11-11).

Defaults

None.

Mode

Switch command, read-write.

Usage

If you configure the device using option **be** or **cs0 with** the command **set diffserv policy police action conform markdscp** *policyname* **every**, the command will execute properly, but will be displayed in the running config as **set diffserv policy police action conform markdscp** *policyname* **every 0**.

Example

This example shows how to set the policing action to send for packets conforming to Diffserv policy "admin," class "system."

```
B2(rw)->set diffserv policy police action conform send admin system
```

set diffserv policy police action nonconform

Use this command to configure traffic policing actions for packets that do not conform to associated Diffserv classifications.

Syntax

set diffserv policy police action nonconform {**drop** | **send** *policyname classname}* | *{***markdscp | markprec** *policyname classname value}*

Parameters

drop | **send**	Specifies whether the policing action for packets not conforming to the classification parameters will be to drop or send packets.

policyname	Specifies the policy name being configured.
classname	Specifies a Diffserv class to associate to this policing action.
markdscp | **markprec**	Specifies a policing action based on IP DHCP or precedence.
value	Specifies an IP DHCP or precedence value set with the **set diffserv policy mark** command (page 11-11).

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the policying action to drop for packets not conforming to the Diffserv policy "admin," class "system."

```
B2(rw)->set diffserv policy police action nonconform drop admin system
```

set diffserv policy rename

Use this command to change the name of a Diffserv policy.

Syntax

set diffserv policy rename *policyname newpolicyname*

Parameters

policyname	Specifies the policy name previously set for this new Diffserv class.
newpolicyname	Specifies a new policy name.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to rename the "admin" Diffserv policy to "system":

```
B2(rw)->set diffserv policy rename admin system
```

Assigning Policies to Service Ports

Purpose

To review and assign Diffserv policies and their associated classes to service ports.

Commands

For information about...	Refer to page...
show diffserv service info	11-15
show diffserv service stats	11-15
set diffserv service	11-16

show diffserv service info

Use this command to display information about Diffserv service ports.

Syntax

show diffserv service info {**summary** | **detailed** *port-string*} {**in**}

Parameters

summary	Displays Diffserv service port summary information.
detailed *port-string*	Displays detailed information for a specific port(s).
in	Displays information about incoming traffic.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display a summary of incoming Diffserv service port traffic:

```
B2(rw)->show diffserv service info summary in

DiffServ Admin Mode............................ Enable

 Interface   Direction     OperStatus  Policy Name
 ----------- -----------   ----------  ----------------------
 ge.1.1       In            Up          admin
 ge.1.2       In            Up          admin
 ge.1.3       In            Up          admin
```

show diffserv service stats

Use this command to display Diffserv policy service statistics.

Syntax

show diffserv service stats {**summary** | **detailed** *port-string*} {**in**}

Parameters

summary	Displays Diffserv a summary of service statistics.
detailed *port-string*	Displays detailed statistics for a specific port.
in	Displays information about incoming traffic.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display a detailed incoming traffic statistics about service port ge.1.1:

```
B2(rw)->show diffserv service stats detailed ge.1.1 in
Interface..................................... ge.1.1

Direction..................................... In
Operational Status............................ Up
Policy Name................................... admin

Class Name.................................... system
In Discarded Packets.......................... 0
```

set diffserv service

Use this command to add or remove a Diffserv policy to incoming traffic on one or more ports.

Syntax

set diffserv service {**add** | **remove**} {**in**} *port-string policyname*

Parameters

add | **remove**	Adds or removes the specified policy.
in	Adds or removes the specified policy to incoming traffic.
port-string	Specifies the port(s) to which this policy configuration will be applied.
policyname	Specifies the policy name to be added to or removed from port traffic.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to apply the Diffserv policy named “admin” to incoming traffic on ports ge1.1-10:

```
B2(rw)->set diffserv service add in ge.1.5 admin
```

DiffServ Configuration Examples

Typically, you would use the Diffserv command set to complete configuration tasks in the following order:

1. Enable DiffServ.
2. Create a Class.
3. Create one or more classification rules within the Class.
4. Create a Policy.
5. Add one or more Classes to the Policy.
6. Add Policing (Conforming/Non-conforming, Drop/Forward, Rate Limit, Precedence/DSCP Rewrite) actions or just Marking (Precedence/DSCP Rewrite) actions to the Policy.
7. Assign the Policy to one or more ports.

The following examples show how to proceed through these tasks to create DiffServ policies.

This example creates two separate policies:

a. **policyef** — rate-limits ingressed traffic on port fe.1.1 to a maximum of 100Mb/s, and on the same traffi,c also rewrites the six DSCP bits to a decimal value of 46 for Express Forwarding on layer 3.

b. **policyaf31** — rate-limits ingressed traffic on port fe.1.2 to a maximum of 100Mb/s, and on the same traffic, also rewrites the six DSCP bits to a decimal value of 26 for Flash forwarding on layer 3.

```
B2(rw)->set diffserv adminmode enable
B2(rw)->set diffserv class create all classevery
B2(rw)->set diffserv class match every classevery
B2(rw)->set diffserv policy create policyef in
B2(rw)->set diffserv policy class add policyef classevery
B2(rw)->set diffserv policy police style simple policyef classevery 100000 128
B2(rw)->set diffserv policy police action conform markdscp policyef classevery ef
B2(rw)->set diffserv policy create policyaf31 in
B2(rw)->set diffserv policy class add policyaf31 classevery
B2(rw)->set diffserv policy police style simple policyaf31 classevery 100000 128
B2(rw)->set diffserv policy police action conform markdscp policyaf31 classevery
af31
B2(rw)->set diffserv service add in fe.1.1 policyef
B2(rw)->set diffserv service add in fe.1.2 policyaf31
```

This example creates one policy which identifies VOIP traffic (DSCP value 46 or 32) on ports ge.1.1 through ge.1.10, and drops all other traffic.

```
B2(rw)->set diffserv adminmode enable
B2(rw)->set diffserv class create all classVOIP
B2(rw)->set diffserv class match ipdscp classVOIP ef
B2(rw)->set diffserv class match ipdscp classVOIP cs4
B2(rw)-> set diffserv policy create policyQOS in
B2(rw)-> set diffserv policy class add policyQOS classVOIP
B2(rw)->set diffserv policy police style simple policyQOS classVOIP 1000000 128
B2(rw)->set diffserv policy police action nonconform drop policyQOS classVOIP
B2(rw)-> set diffserv service add in ge.1.1-10 policyQOS
```

12

Policy Classification Configuration

This chapter describes the Policy Classification set of commands and how to use them.

Note: A license is required to enable Policy on the SecureStack B2 switch. Refer to the chapter entitled “Activating Licensed Features” for more information.

However, configuring CoS-based flood control does not require a policy license.

For information about...	Refer to page...
Policy Classification Configuration Summary	12-1
Configuring Policy Profiles	12-1
Configuring Classification Rules	12-6
Assigning Ports to Policy Profiles	12-15
Configuring Policy Class of Service (CoS)	12-17

Policy Classification Configuration Summary

SecureStack B2 devices support policy profile-based provisioning of network resources by allowing IT administrators to:

- Create, change or remove policy profiles based on business-specific use of network services.
- Permit or deny access to specific services by creating and assigning classification rules which map user profiles to protocol-based frame filtering policies configured for a particular VLAN or Class of Service (CoS).
- Assign or unassign ports to policy profiles so that only ports activated for a profile will be allowed to transmit frames accordingly.

Note: It is recommended that you use Enterasys Networks NetSight Policy Manager as an alternative to CLI for configuring policy classification on the SecureStack B2 devices.

Configuring Policy Profiles

Purpose

To review, create, change and remove user profiles that relate to business-driven policies for managing network resources.

Note: B3, C3, and G3 devices support profile-based CoS traffic rate limiting only. Policy rules specifying CoS will only rate limit on D2, C2 and B2 devices, including when C2 and B2 devices are configured on mixed stacks containing B3 and C3 devices.

Commands

For information about...	Refer to page...
show policy profile	12-2
set policy profile	12-3
clear policy profile	12-4

show policy profile

Use this command to display policy profile information.

Syntax

show policy profile {**all** | *profile-index* [*consecutive-pids*] [**-verbose**]}

Parameters

all | *profile-index*	Displays policy information for all profile indexes or a specific profile index.
consecutive-pids	(Optional) Displays information for specified consecutive profile indexes.
-verbose	(Optional) Displays detailed information.

Defaults

If optional parameters are not specified, summary information will be displayed for the specified index or all indices.

Mode

Switch command, read-only.

Example

This example shows how to display policy information for profile 11:

```
B2(su)->show policy profile 11
Profile Index            : 11
Profile Name             : MacAuth1
Row Status               : active
Port VID Status          : Enable
Port VID Override        : 11
CoS                      : 0
CoS Status               : Disable
Egress Vlans             : none
Forbidden Vlans          : none
Untagged Vlans           : none
Rule Precedence          : 1-31
                         :MACSource(1),MACDest(2),Unknown(3),
                         :Unknown(4),Unknown(5),Unknown(6),
                         :Unknown(7),Unknown(8),Unknown(9),
                         :Unknown(10),Unknown(11),IPSource(12),
```

```
                          :IPDest(13),IPFrag(14),UDPSrcPort(15),
                          :UDPDestPort(16),TCPSrcPort(17),TCPDestPort(18),
                          :ICMPType(19),Unknown(20),IPTOS(21),
                          :IPProto(22),Unknown(23),Unknown(24),
                          :Ether(25),Unknown(26),VLANTag(27),
                          :Unknown(28),Unknown(29),Unknown(30),
                          :port(31)
Admin Profile Usage       : none
Oper Profile Usage        : none
Dynamic Profile Usage     : none
```

Table 12-29 provides an explanation of the command output.

Table 12-29 show policy profile Output Details

Output Field	What It Displays...
Profile Index	Number of the profile.
Profile Name	User-supplied name assigned to this policy profile.
Row Status	Whether or not the policy profile is enabled (**active**) or disabled.
Port VID Status	Whether or not PVID override is **enabled** or **disabled** for this profile. If all classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior.
Port VID Override	The PVID assigned to packets, if PVID override is enabled.
CoS	CoS priority value to assign to packets, if CoS override is enabled.
CoS Status	Whether or not Class of Service override is **enabled** or **disabled** for this profile. If all classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior.
Egress VLANs	VLAN(s) that ports to which the policy profile is assigned can use for tagged egress.
Forbidden VLANs	VLAN(s) forbidden to ports to which the policy profile is assigned.
Untagged VLANs	VLAN(s) that ports to which the policy profile is assigned can use for untagged egress.
Rule Precedence	Displays the precedence of types of rules.
Admin Profile Usage	Ports administratively assigned to use this policy profile.
Oper Profile Usage	Ports currently assigned to use this policy profile.
Dynamic Profile Usage	Port dynamically assigned to use this policy profile.

set policy profile

Use this command to create a policy profile entry.

Syntax

set policy profile *profile-index* [**name** *name*] [**pvid-status** {**enable** | **disable**}] [**pvid** *pvid*] [**cos-status** {**enable** | **disable**}] [**cos** *cos*] [**precedence** *precedence-list*]

Parameters

profile-index	Specifies an index number for the policy profile. Valid values are **1** - **255**.
name *name*	(Optional) Specifies a name for the policy profile. This is a string from 1 to 64 characters.
pvid-status enable | **disable**	(Optional) Enables or disables PVID override for this profile. If all classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior.
pvid *pvid*	(Optional) Specifies the PVID to packets, if PVID override is enabled and invoked as default behavior.
cos-status enable | **disable**	(Optional) Enables or disables Class of Service override for this profile. If all classification rules associated with this profile are missed, then this parameter, if specified, determines default behavior. **Note:** A maximum of 99 rules can be supported per policy profile for policy profiles that have cos-status enabled..
cos *cos*	(Optional) Specifies a CoS value to assign to packets, if CoS override is enabled and invoked as default behavior. Valid values are **0** to **7**.
precedence *precedence-list*	(Optional) Assigns a rule precedence to this profile. Lower values will be given higher precedence. For a list of values, refer to the **show policy profile** command output.

Defaults

If optional parameters are not specified, none will be applied.

Mode

Switch command, read-write.

Example

This example shows how to create a policy profile 1 named “netadmin” with PVID override enabled for PVID 10, and Class-of-Service override enabled for CoS 5:

```
B2(su)->set policy profile 1 name netadmin pvid-status enable pvid 10 cos-status
enable cos 5
```

clear policy profile

Use this command to delete a policy profile entry.

Syntax

clear policy profile *profile-index*

Parameters

profile-index	Specifies the index number of the profile entry to be deleted. Valid values are **1** to **255**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete policy profile 8:

```
B2(su)->clear policy profile 8
```

Configuring Classification Rules

Purpose

To review, create, assign, and unassign classification rules to policy profiles. This maps user profiles to protocol-based frame filtering policies.

Note: B3, C3, and G3 devices support profile-based CoS traffic rate limiting only. Policy rules specifying CoS will only rate limit on D2, C2 and B2 devices, including when C2 and B2 devices are configured on mixed stacks containing B3 and C3 devices.

Commands

For information about...	Refer to page...
show policy rule	12-6
show policy capability	12-8
set policy rule	12-10
clear policy rule	12-13
clear policy all-rules	12-14

show policy rule

Use this command to display policy classification rule information.

Syntax

show policy rule [**all** | **admin-profile** | *profile-index*] [**ether** | **icmptype** | **ipproto** | **ipdestsocket** | **ipsourcesocket** | **iptos** | **macdest** | **macsource** | **tcpdestport** | **tcpsourceport** | **udpdestport** | **udpsourceport**] [*data*] [**mask** *mask*] [**port-string** *port-string*] [**rule-status** {**active** | **not-in-service** | **not-ready**}] [**storage-type** {**non-volatile** | **volatile**}] [**vlan** *vlan*] | [**drop** | **forward**] [**dynamic-pid** *dynamic-pid*] [**cos** *cos*] [**admin-pid** *admin-pid*] [**-verbose**] [**usage-list**] [**display-if-used**]

Parameters

all | **admin-profile** | *profile-index*	Displays policy classification rules for **all** profiles, the **admin-profile**, or for a specific profile index number. Valid values are **1** - **1023**.
ether	Displays Ethernet type II rules.
icmptype	Displays ICMP type rules.
ipproto	Displays IP protocol field in IP packet rules.
ipdestsocket	Displays IP destination address rules.
ipsourcesocket	Displays IP source address rules.
iptos	Displays Type of Service rules.
macdest	Displays MAC destination address rules.
macsource	Displays MAC source address rules.

tcpdestport	Displays TCP destination port rules.
tcpsourceport	Displays TCP source port rules.
udpdestport	Displays UDP destination port rules.
udpsourceport	Displays UDP source port rules.
data	Displays rules for a predefined classifier. This value is dependent on the classification type entered. Refer to Table 12-31 for valid values for each classification type.
mask *mask*	(Optional) Displays rules for a specific data mask. Refer to Table 12-31 for valid values for each classification type and data value**.**
port-string *port-string*	(Optional) Displays rules related to a specific ingress port.
rule-status active | **not-in-service** | **not-ready**	(Optional) Displays rules related to a specific rules status.
storage-type non-volatile | **volatile**	(Optional) Displays rules configured for either non-volatile or volatile storage.
vlan *vlan*	(Optional) Displays rules for a specific VLAN ID.
drop | **forward**	Displays rules based on whether matching packets will be dropped or forwarded.
dynamic-pid *dynamic-pid*	Displays rules associated with a specific dynamic policy ID.
cos *cos*	(Optional) Displays rules for a Class-of-Service value.
admin-pid *admin-pid*	Displays rules associated with a specific administrative policy ID [1..1023].
-verbose	(Optional) Displays detailed information.
usage-list	(Optional) If selected, each rule's usage-list shall be checked and shall display only those ports which have applied this rule.
display-if-used	(Optional) Displays rule(s) only if they are applied to at least one port.

Defaults

If **verbose** is not specified, summary information will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display policy classification information for Ethernet type 2 rules

```
B2(su)->show policy rule ether
|PID  |Rule Type   |Rule Data            |Mk|PortStr   |RS|ST|VLAN|CoS |U|
|02   |Ether       |2048  (0x0800)       |16|All       | A|NV|fwrd|    |?|
|02   |Ether       |2049  (0x0801)       |16|All       | A|NV|drop|    |?|
|02   |Ether       |2989  (0x0bad)       |16|All       | A|NV|drop|    |?|
|02   |Ether       |33079 (0x8137)       |16|All       | A|NV|drop|    |?|
```

This example shows how to display policy classification information for administrative rule 1

```
B2(su)->show policy rule admin-pid 1
|Admin|Rule Type   |Rule Data            |Mk|PortStr   |RS|ST|dPID|aPID|U|
```

```
|admin|Port        |fe.1.1              |16|fe.1.1    | A|NV|    |   1|?|
|admin|Port        |fe.1.2              |16|fe.1.2    | A|NV|    |   1|?|
|admin|Port        |fe.1.3              |16|fe.1.3    | A|NV|    |   1|?|
|admin|Port        |fe.1.4              |16|fe.1.4    | A|NV|    |   1|?|
|admin|Port        |fe.1.5              |16|fe.1.5    | A|NV|    |   1|?|
|admin|Port        |fe.1.6              |16|fe.1.6    | A|NV|    |   1|?|
|admin|Port        |fe.1.7              |16|fe.1.7    | A|NV|    |   1|?|
|admin|Port        |fe.1.8              |16|fe.1.8    | A|NV|    |   1|?|
|admin|Port        |fe.1.9              |16|fe.1.9    | A|NV|    |   1|?|
|admin|Port        |fe.1.10             |16|fe.1.10   | A|NV|    |   1|?|
|admin|Port        |fe.1.11             |16|fe.1.11   | A|NV|    |   1|?|
|admin|Port        |fe.1.12             |16|fe.1.12   | A|NV|    |   1|?|
```

Table 12-30 provides an explanation of the command output.

Table 12-30 show policy rule Output Details

Output Field	What It Displays...
PID	Profile index number. Assigned to this classification rule with the **set policy profile** command (“set policy profile” on page 12-3).
Rule Type	Type of classification rule. Refer to Table 12-31 for valid types.
Rule Data	Rule data value. Refer to Table 12-31 for valid values for each classification type.
Mk	Rule data mask. Refer to Table 12-31 for valid values for each classification data value.
PortStr	Ingress port(s) to which this rule applies.
RS	Whether or not the status of this rule is active (A), not in service or not ready.
ST	Whether or not this rule’s storage type is non-volatile (NV) or volatile (V).
VLAN	VLAN ID to which this rule applies and whether or not matching packets will be dropped or forwarded.
CoS	If applicable, Class of Service value to which this rule applies.
U	Whether or not this rule has been used.
dPID	Whether or not this is a dynamic profile ID.
aPID	Whether or not this is an administrative profile ID.

show policy capability

Use this command to display detailed policy classification capabilities supported by your SecureStack B2 device.

Syntax

`show policy capability`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Usage

Use this command to display detailed policy classification capabilities supported by your SecureStack B2 device. The output of this command shows a table listing classifiable traffic attributes and the type of actions, by rule type, that can be executed relative to each attribute. Above the table is a list of all the actions possible on this device.

The left-most column of the table lists all possible classifiable traffic attributes. The next two columns from the left indicate how policy profiles may be assigned, either administratively or dynamically. The next four columns from the left indicate the actions that may be performed. The last three columns indicate auditing options.

An x in an action column for a traffic attribute row indicates that your system has the capability to perform that action for traffic classified by that attribute.

Example

This example shows how to display the device's policy classification capabilities. Refer to "set policy rule" on page 12-10 for a description of the parameters displayed:

```
B2(su)->show policy capability

The following supports related to policy are supported in this device:
VLAN Forwarding              Priority                       Permit
Deny                         Precedence Reordering          Rules Table
Rule-Use Notification        Longest Prefix Rules
 ============================================================
|                          | D |   |   |   | F |   |   | D |
|                          | Y |   |   |   | O | S |   | I |
|                          | N | A |   |   | R | Y |   | S |
|                          | A | D | V |   | D | W | S | T | A |
|                          | M | M | L | C | R | A | L | R | B |
|                          | I | I | A | O | O | R | O | A | L |
| SUPPORTED RULE TYPES     | C | N | N | S | P | D | G | P | E |
 ============================================================
|MAC source address        |   |   |   | X | X | X |   |   |   |
|MAC destination address   |   |   |   | X | X | X |   |   |   |
|IPX source address        |   |   |   |   |   |   |   |   |   |
|IPX destination address   |   |   |   |   |   |   |   |   |   |
|IPX source socket         |   |   |   |   |   |   |   |   |   |
|IPX destination socket    |   |   |   |   |   |   |   |   |   |
|IPX transmission control  |   |   |   |   |   |   |   |   |   |
|IPX type field            |   |   |   |   |   |   |   |   |   |
|IPv6 source address       |   |   |   |   |   |   |   |   |   |
|IPv6 destination address  |   |   |   |   |   |   |   |   |   |
|IPv6 flow label           |   |   |   |   |   |   |   |   |   |
|IP source address         |   |   |   | X | X | X |   |   |   |
|IP destination address    |   |   |   | X | X | X |   |   |   |
|IP fragmentation          |   |   |   |   |   |   |   |   |   |
|UDP port source           |   |   |   | X | X | X |   |   |   |
|UDP port destination      |   |   |   | X | X | X |   |   |   |
|TCP port source           |   |   |   | X | X | X |   |   |   |
|TCP port destination      |   |   |   | X | X | X |   |   |   |
|ICMP packet type          |   |   |   | X | X | X |   |   |   |
|TTL                       |   |   |   |   |   |   |   |   |   |
|IP type of service        |   |   |   | X | X | X |   |   |   |
|IP proto                  |   |   |   | X | X | X |   |   |   |
```

```
|Ether II packet type     |   |   | X | X | X | X |   |   |   |
|LLC DSAP/SSAP/CTRL       |   |   |   |   |   |   |   |   |   |
|VLAN tag                 |   |   |   |   |   |   |   |   |   |
|Replace tci              |   |   |   |   |   |   |   |   |   |
|Port string              | X | X | X | X | X | X |   |   |   |
=============================================================
```

set policy rule

Use this command to assign incoming untagged frames to a specific policy profile and to VLAN or Class-of-Service classification rules.

Syntax

This command has two forms of syntax—one to create an admin rule, and the other to create a traffic classification rule and attach it to a policy profile.

set policy rule admin-profile {**vlantag** *data* [**mask** *mask*] **admin-pid** *profile-index*} [**port-string** *port-string*]

set policy rule *profile-index* {**ether** | **icmptype** | **ipproto** | **ipdestsocket** | **ipsourcesocket** | **iptos** | **macdest** | **macsource** | **tcpdestport** | **tcpsourceport** | **udpdestport** | **udpsourceport**} *data* [**mask** *mask*] {[**vlan** *vlan*] [**cos** *cos]* | [**drop** | **forward**]}

Note: Classification rules are automatically enabled when created.

Parameters

The following parameters apply to creating an admin rule. See the Usage section below for more information about admin rules.

admin-profile	Specifies that this is an admin rule.
vlantag *data*	Classifies based on VLAN tag specified by *data*. Value of *data* can range from 1 to 4094 or 0xFFF.
mask *mask*	(Optional) Specifies the number of significant bits to match, dependent on the *data* value entered. Value of *mask* can range from 1 to 12. Refer to Table 12-31 for valid values for each classification type and data value**.**
admin-pid *profile-index*	Associates this admin rule with a policy profile, identified by its index number. Policy profiles are configured with the **set policy profile** command as described in "set policy profile" on page 12-3. Valid *profile-index* values are **1**- **255**.
port-string *port-string*	(Optional) Assigns this rule with the specified policy profile on specific ingress port(s). Rule would not be used until policy is assigned to the specified port(s) using the **set policy port** command as described in "set policy port" on page 12-15.

The following parameters apply to creating a traffic classification rule.

profile-index	Specifies a policy profile number to which this rule will be assigned. Policy profiles are configured with the **set policy profile** command as described in "set policy profile" on page 12-3. Valid *profile-index* values are **1**- **255**.
ether	Specifies that the rule should apply to traffic with the specified type field in Ethernet II packet.
icmptype	Classifies based on ICMP type.
ipproto	Specifies that the rule should apply to traffic with the specified Protocol field in IP packet.
ipdestsocket	Specifies that the rule should apply to traffic with the specified destination IP address with optional post-fixed port.
ipsourcesocket	Specifies that the rule should apply to traffic with the specified source IP address, with optional post-fixed port.
iptos	Specifies that the rule should apply to traffic with the specified Type of Service field in IP packet.
macdest	Specifies that the rule should apply to traffic with the specified MAC destination address.
macsource	Specifies that the rule should apply to traffic with the specified MAC source address.
tcpdestport	Specifies that the rule should apply to traffic with the specified TCP destination port.
tcpsourceport	Specifies that the rule should apply to traffic with the specified TCP source port.
udpdestport	Specifies that the rule should apply to traffic with the specified UDP destination port.
udpsourceport	Specifies that the rule should apply to traffic with the specified UDP source port.
data	Specifies the code for the specified traffic classifier (listed above). This value is dependent on the classification type entered. Refer to Table 12-31 for valid values for each classification type.
mask *mask*	(Optional) Specifies the number of significant bits to match, dependent on the *data* value entered. Refer to Table 12-31 for valid values for each classification type and data value**.**
vlan *vlan*	Specifies the action of the rule is to classify to a VLAN ID.
cos *cos*	Specifies the action of the rule is to classify to a Class-of-Service ID. Valid values are **0 - 4095**. A value of -1 indicates that no CoS forwarding behavior modification is desired. (Not supported on B3, C3, and G3.)
drop | **forward**	Specifies that packets within this classification will be dropped or forwarded.

Defaults

None.

Mode

Switch command, read-write.

Usage

An admin rule can be used to map incoming tagged frames to a policy role (profile). There can be only one admin rule configured per system (stack). Typically, this rule is used to implement the "User + IP phone" feature. Refer to "Configuring Multi-User Authentication (User + IP phone)" on page 19-33 for more information. You would configure a policy profile/role for IP phones (for example, assigning the traffic to a "voice" VLAN), then associate that policy profile with the admin rule, and associate the admin rule with the desired ports. Users authenticating over the same port will typically use a dynamically assigned policy role.

A policy classification rule has two main parts: Traffic Description and Actions. The Traffic Description identifies the type of traffic to which the rule will pertain. Actions specify whether that traffic will be assigned class of service, assigned to a VLAN, or both.

Table 12-31 provides the **set policy rule** *data* values that can be entered for a particular parameter, and the *mask* bits that can be entered for each classifier associated with that parameter.

Table 12-31 Valid Values for Policy Classification Rules

Classification Rule Parameter	*data* value	*mask* bits
ether	Type field in Ethernet II packet: **1536** - **65535** or **0x600 - 0xFFFF**	Not applicable.
icmptype	ICMP Type: **a.b**	Not applicable.
ipproto	Protocol field in IP packet: **0 - 255** or **0 - 0xFF**	Not applicable.
Destination or Source IP Address: ipdestsocket ipsourcesocket	IP Address in dotted decimal format: **000.000.000.000** and (Optional) post-fixed port: **0** - **65535**	**1** - **48**
iptos	Type of Service field in IP packet: **0 - 252** or **0 - 0xFC**	Not applicable.
Destination or Source MAC: macdest macsource	MAC Address: **00-00-00-00-00-00**	**1** - **48**
Destination or Source TCP port: tcpdestport tcpsourceport	TCP Port Number: **0 - 65535** or **0 - 0xFFFF**	**1** - **16**
Destination or Source UDP port: udpsourceport udpdestport	UDP Port Number: **0 - 65535** or **0 - 0xFFFF**	**1** - **16**
vlantag	VLAN tag: **1**- **4094**	Not applicable.

Examples

This example shows how to use Table 12-31 to assign a rule to policy profile 3 that will filter Ethernet II Type 1526 frames to VLAN 7:

```
B2(su)->set policy rule 3 ether 1526 vlan 7
```

This example shows how to use Table 12-31 to assign a rule to policy profile 5 that will forward UDP packets from source port 45:

```
B2(su)->set policy rule 5 udpportsource 45 forward
```

This example shows how to use Table 12-31 to assign a rule to policy profile 1 that will drop IP source traffic from IP address 1.2.3.4. If mask 32 is not specified as shown, a default mask of 48 bits (IP address + port) would be applied:

```
B2(su)->set policy rule 1 ipsourcesocket 1.2.3.4 mask 32 drop
```

clear policy rule

Use this command to delete policy classification rule entries.

Syntax

This command has two forms of syntax—one to clear an admin rule (for policy ID 0), and the other to clear a classification rule.

clear policy rule admin-profile {**vlantag** *data* [**mask** *mask*]

clear policy rule *profile-index* {**all-pid-entries** | {**ether** | **icmptype** | **ipproto** | **ipdestsocket** | **ipsourcesocket** | **iptos** | **macdest** | **macsource** | **tcpdestport** | **tcpsourceport** | **udpdestport** | **udpsourceport**}}

Parameters

The following parameters apply to deleting an admin rule.

admin-profile	Specifies that the rule to be deleted is an admin rule for policy ID 0.
vlantag *data*	Deletes the rule based on VLAN tag specified by *data*. Value of *data* can range from 1 to 4094 or 0xFFF.
mask *mask*	(Optional) Specifies the number of significant bits to match, dependent on the *data* value entered. Value of *mask* can range from 1 to 12. Refer to Table 12-31 for valid values for each classification type and data value**.**

The following parameters apply to deleting a classification rule.

profile-index	Specifies a policy profile for which to delete classification rules. Valid *profile-index* values are **1** - **255**.
all-pid-entries	Deletes all entries associated with the specified policy profile.
ether	Deletes associated Ethernet II classification rule.
icmptype	Deletes associated ICMP classification rule.
ipproto	Deletes associated IP protocol classification rule.
ipdestsocket	Deletes associated IP destination classification rule.
ipsourcesocket	Deletes associated IP source classification rule.
iptos	Deletes associated IP Type of Service classification rule.
macdest	Deletes associated MAC destination address classification rule.
macsource	Deletes associated MAC source address classification rule.
tcpdestport	Deletes associated TCP destination port classification rule.
tcpsourceport	Deletes associated TCP source port classification rule.

udpdestport	Deletes associated UDP destination port classification rule.
udpsourceport	Deletes associated UDP source port classification rule.

Defaults

When applicable, *data* and *mask* must be specified for individual rules to be cleared.

Mode

Switch command, read-write.

Examples

This example shows how to delete Ethernet II Type 1526 classification rule entries associated with policy profile 1 from all ports

```
B2(su)->clear policy rule 1 ether 1526
```

This example shows how to remove a rule from policy profile 5 that will forward UDP frames from source port 45:

```
B2(su)->clear policy rule 5 udpportsource 45 forward
```

clear policy all-rules

Use this command to remove all policy classification rules.

Syntax

```
clear policy all-rules
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to remove all administrative and policy index rules:

```
B2(su)->clear policy all-rules
```

Assigning Ports to Policy Profiles

Note: The B2 switch supports up to three user policies per port.

Purpose

To assign and unassign ports to policy profiles.

Commands

For information about...	Refer to page...
set policy port	12-15
clear policy port	12-16

set policy port

Use this command to assign ports to a policy profile.

Syntax

`set policy port` *`port-string profile-index`*

Parameters

port-string	Specifies the port(s) to add to the policy profile. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
profile-index	Specifies the ID of the policy profile (role) to which the port(s) will be added. This value must match the *profile-index* value assigned using the **set policy profile** command ("set policy profile" on page 12-3) in order for a policy profile to be active on the specified port.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to allow Gigabit Ethernet ports 5 through 15 in slot 1 to transmit frames according to policy profile 1:

```
B2(su)->set policy port fe.1.5-15 1
```

clear policy port

Use this command to remove a policy profile from one or more ports.

Syntax

clear policy port *port-string profile-index*

Parameters

port-string	Specifies the port(s) from which to remove the policy profile. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
profile-index	Specifies the ID of the policy profile (role) to which the port(s) will be added. This value must match the *profile-index* value assigned using the **set policy profile** command ("set policy profile" on page 12-3) in order for a policy profile to be active on the specified port.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to remove policy profile 10 from port 21 in slot 1:

```
B2(rw)->clear policy port fe.1.21 10
```

Configuring Policy Class of Service (CoS)

Note: It is recommended that you use Enterasys Networks NetSight Policy Manager as an alternative to CLI for configuring policy-based CoS on the switches.

The SecureStack B2 supports Class of Service (CoS), which allows you to assign mission-critical data to a higher priority through the device by delaying less critical traffic during periods of congestion. The higher priority traffic going through the device is serviced first (before lower priority traffic). The Class of Service capability of the device is implemented by a priority queueing mechanism. Class of Service is based on the IEEE 802.1D (802.1p) standard specification, and allows you to define eight priorities (0-7, with 7 granted highest priority) and up to 8 transmit queues (0-7) for each port.

By default, policy-based CoS is disabled on the device, and default or user-assigned port-based 802.1D (802.1p) settings are used to determine traffic prioritization. When policy-based CoS is enabled, the default and user-assigned policy-based settings will override port-based settings described in Chapter 13.

Class of Service functionality can also be used to control broadcast, unknown unicast, and/or multicast flooding. This feature prevents configured ports from being disrupted by a traffic storm by rate-limiting specific types of packets through those ports. Refer to "About CoS-Based Flood Control" on page 12-19 for more information.

Note: Unlike CoS-based rate limiting, CoS-based flood control does not require a policy license on SecureStack B2 and B3 switches or on standalone D2 switches.

About Policy-Based CoS Configurations

Once enabled using the **set cos state** command, you can add to the policy-based CoS function by defining new port groupings, and assigning inbound rate limiters. The process for user-defined CoS configuration involves the following steps and associated commands listed in Procedure 12-1. An example follows the procedure.

Procedure 12-1 User-Defined CoS Configuration

Step	Task	Command(s)
1.	Enable CoS	**set cos state enable**
2.	Create CoS IRL port groups	**set cos port-config irl**
3.	Define physical rate limiters for groups	**set cos port-resource irl**
4.	Create virtual reference for the IRL resource (physical reference) for each port group	**set cos reference**
5.	Add IRL reference to CoS settings table	**set cos settings**

Example

This example creates different inbound rate limiters for two port groups and then assigns them to traffic with a CoS setting of 0.

1. Configure two port groups, one for user ports and one for uplink ports and assign ports to the groups. Port group 1.0 will represent user ports, group 2.0 will represent uplink ports.

```
B2(su)->set cos port-config irl 1.0 name Users ports fe.1.1-46
B2(su)->set cos port-config irl 2.0 name Uplink ports fe.1.47-48
```

```
B2(su)->show cos port-config
Inbound Rate Limiting Port Configuration Entries
--------------------------------------------------------------------------
Port Group Name  :Default
Port Group       :0
Port Type        :0
Assigned Ports   :none
--------------------------------------------------------------------------
Port Group Name  :Users
Port Group       :1
Port Type        :0
Assigned Ports   :fe.1.1-46
--------------------------------------------------------------------------
Port Group Name  :Uplink
Port Group       :2
Port Type        :0
Assigned Ports   :fe.1.47-48
--------------------------------------------------------------------------
```

2. Configure physical inbound rate limiters for each port group. For the user port group (1.0), create an IRL (irl-index of 1) for 512 kbps. For the uplink port group (2.0), create an IRL (irl-index of 1) for 10 megabits per second (10,000 kbps).

```
B2(su)->set cos port-resource irl 1.0 1 unit kbps rate 512
B2(su)->set cos port-resource irl 2.0 1 unit kbps rate 10000

B2(su)->show cos port-resource irl 1.0 1
Group Index Resource Type Unit    Rate      Rate Limit Type Action
----------- -------- ---- ---- ----------   --------------- ------
1.0         1        irl  kbps 512          drop            none

B2(su)->show cos  port-resource irl 2.0 1
Group Index Resource Type Unit    Rate      Rate Limit Type Action
----------- -------- ---- ---- ----------   --------------- ------
2.0         1        irl  kbps 10000        drop            none
```

3. In the CoS IRL reference mapping table for each port group, create a reference for each IRL resource created in the previous step. We will use reference number 1.

```
B2(su)->set cos reference irl 1.0 1 rate-limit 1
B2(su)->set cos reference irl 2.0 1 rate-limit 1

B2(su)->show cos reference irl 1.0

Group Index Reference Type Rate Limiter
----------- --------- ---- ------------
1.0         0         irl  none
1.0         1         irl  1
1.0         2         irl  none
1.0         3         irl  none
...
1.0         97        irl  none
1.0         98        irl  none
1.0         99        irl  none

B2(su)->show cos reference irl 2.0

Group Index Reference Type Rate Limiter
----------- --------- ---- ------------
2.0         0         irl  none
2.0         1         irl  1
```

```
2.0         2         irl  none
2.0         3         irl  none
...
2.0         97        irl  none
2.0         98        irl  none
2.0         99        irl  none
```

4. In the CoS settings table, configure a CoS setting for CoS index 1, which has a priority of 0. We enter the IRL reference, created in the previous step.

```
B2(su)->set cos settings 0 irl-reference 1
B2(su)->show cos settings
CoS Index Priority   ToS     IRL
--------- ---------- ------- -----
   0         0          *       1
   1         1          *       *
   2         2          *       *
   3         3          *       *
   4         4          *       *
   5         5          *       *
   6         6          *       *
   7         7          *       *
```

About CoS-Based Flood Control

Note: CoS-based flood control does not require a policy license on SecureStack B2 and B3 switches or on standalone D2 switches.

CoS-based flood control prevents configured ports from being disrupted by a traffic storm by rate-limiting specific types of packets through those ports. When flood control is enabled on a port, incoming traffic is monitored over one second intervals. During an interval, the incoming traffic level for each configured traffic type is compared with the configured traffic storm control level, specified as a percentage of the total available bandwidth of the link. The default threshold is 5% of link speed.

If, during a one second interval, the incoming traffic of a configured type reaches the traffic storm control level configured on the port, CoS-based flood control drops the traffic until the interval ends. Packets are then allowed to flow again until the limit is again reached.

The following procedure describes the steps and commands required to configure CoS-based flood control.

Procedure 12-2

Step	Task	Command(s)
1.	Enable CoS.	**set cos state enable**
2.	Create a CoS flood control port resource, which specifies flood control rate limiters that can be mapped to specific ports.	**set cos port-resource flood-ctrl**
3.	Assign the flood control resource to specific ports.	**set cos port-config flood-ctrl**

Example

This example creates a broadcast rate limiter (index 1.0) of 5 packets per second and assigns it to ports fe.1.2 and fe.2.2.

```
B2(su)->set cos state enable
B2(su)->set cos port-resource flood-ctrl 1.0 broadcast rate 5
B2(su)->set cos port-config flood-ctrl 1.0 ports fe.1.2;fe.2.2 append
```

Commands

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clear cos all-entries	12-35
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set cos state

Use this command to enable or disable Class of Service.

Syntax

`set cos state {enable | disable}`

Parameters

enable | **disable**	Enables or disables Class of Service on the switch. Default state is disabled.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable Class of Service:

```
B2(rw)->set cos state enable
```

show cos state

Use this command to display the Class of Service enable state.

Syntax

`show cos state`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to show the Class of Service enable state:

```
B2(rw)->show cos state
Class-of-Service application is enabled
```

clear cos state

Use this command to set CoS state back to its default setting of disabled.

Syntax

`clear cos state`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the CoS state back to its default setting of disabled:

```
B2(su)->clear cos state
```

set cos settings

Use this command to configure a Class of Service entry in the CoS settings table.

Syntax

set cos settings *cos-index* **priority** *priority* [**tos-value** *tos-value*] [**irl-reference** *irl-reference*]

Parameters

cos-index	Specifies a Class of Service entry. Valid values are **0** to **255**.
priority *priority*	Specifies an 802.1d priority value. Valid values are **0** to **7**, with 0 being the lowest priority. See Usage section below for more information.
tos-value *tos-value*	(Optional) Specifies a Type of Service value. Valid values are **0** to **255**. See Usage section below for more information.
irl-reference *irl-reference*	(Optional) Set the inbound rate limiter associated with this entry. Valid values are 0 to 99. See Usage section below for more information.

Defaults

If no optional parameters are specified, none will be applied.

Mode

Switch command, read-write.

Usage

The CoS settings table takes individual class of service features and displays them as belonging to a CoS entry. Essentially, it is used for CoS feature assignment. Each class of service entry consists of an index, 802.1p priority, an optional ToS value, and an IRL reference.

- **CoS Index**

  Indexes are unique identifiers for each CoS setting. CoS indexes 0 through 7 are created by default and mapped directly to 802.1p priority for backwards compatibility. These entries cannot be removed, and 802.1p priority values cannot be changed. When CoS is enabled, indexes are assigned. Up to 256 CoS indexes or entries can be configured.

- **Priority**

  802.1p priority can be applied per CoS index. For each new CoS index created, the user has the option to assign an 802.1p priority value 0 to 7 for the class of service. CoS indexes 0 through 7 map directly to 802.1p priorities and cannot be changed as they exist for backward compatibility.

- **ToS**

  This value can be set per class of service, but is not required. When a frame is assigned to a class of service for which this value is configured, the ToS field of the incoming IP packet will be overwritten to the user-defined value. All but the last two bits of the ToS field are rewritable. ToS can be set for CoS indexes 0 through 7.

- **IRL Reference**

  The CoS IRL reference field is optional, as rate limits are not required. The IRL reference does not assign an inbound rate limit but points to the CoS IRL Reference Mapping Table. This reference may be thought of as the virtual rate limiter that will assign the physical rate limiter defined by the IRL Reference Mapping Table.

Example

This example shows how to create CoS entry 8 with a priority value of 3:

```
B2(rw)->set cos settings 8 priority 3
```

clear cos settings

Use this command to clear Class of Service entry settings.

Syntax

clear cos settings *cos-list* {[**all**] | [**priority**] [**tos-value**] [**irl-reference**]}

Parameters

cos-list	Specifies a Class of Service entry to clear.
all	Clears all settings associated with this entry.
priority	Clears the priority value associated with this entry.
tos-value	Clears the Type of Service value associated with this entry.
irl-reference	Clear the IRL reference associated with this entry.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the priority for CoS entry 8:

```
B2(rw)->clear cos settings 8 priority
```

show cos settings

Use this command to display Class of Service parameters.

Syntax

show cos settings [*cos-list*]

Parameters

cos-list	(Optional) Specifies a Class of Service entry to display.

Defaults

If not specified, all CoS entries will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to show all CoS settings:

```
B2(su)->show cos settings
CoS Index Priority   ToS     IRL       flood-ctrl
--------- ---------- ------- -------   ----------
   0         0          48      *          enabled
   1         1          *       *          enabled
   2         2          *       *          enabled
   3         3          *       *          enabled
   4         4          *       *          enabled
   5         5          *       *          enabled
   6         6          *       *          enabled
   7         7          *       *          enabled
```

set cos port-config

Use this command to create a port group for inbound rate limiting or flood control and add or remove ports from the group.

Syntax

set cos port-config {**irl**|**flood-ctrl**} *group-type-index* [**name** *name*] [**ports** *port-list*] [**append**] | [**clear**]

Parameters

irl	Specifies that this is an inbound rate limiting (IRL) port group.
flood-ctrl	Specifies that this is a flood control port group.
group-type-index	Specifies an inbound rate limiting port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
name *name*	(Optional) User defined name for the **group**.
ports *port-list*	(Optional) Ports assigned to the **group**. All ports must be of the same port **type** (Fast Ethernet, Gigabit Ethernet).
append	(Optional) Append (add) the ports to the ports that are already in the **group**.
clear	(Optional) Clear the given ports from those assigned to the **group**.

Defaults

None.

Mode

Switch command, read-write.

Usage

CoS port groups are identified by group number and the type of ports in the group, in the form of **group#.port-type**. The port group 0.0 exists by default. This default port group cannot be removed and all physical ports in the system are assigned to it. Up to seven additional port groups (1 through 7) can be configured. Currently, only one port type (type 0) is supported. This port type supports 100 limiters.

Additional port groups may be created for flexibility. Ports assigned to a new port group must be mutually exclusive from the other port group entries—ports are automatically removed from the default port group—and must be comprised of the same port type as defined by the port group.

The creation of additional port groups could be used to combine similar ports by their function for flexibility. For instance, ports associated to users can be added to a port group called "Users" and ports associated to uplink ports can be added to a port group called "Uplink." Using these port groups, a single class of service can assign different rate limits to each port group. "User" ports can be assigned one rate limit, while "Uplink" ports can be assigned another.

The command show cos port-config displays each port group configured by group and type, with the group name and associated (assigned) ports. The command show cos port-type displays the available inbound rate limiting resources for the port type.

Example

This example configures two port groups, one for user ports and one for uplink ports and assign ports to the groups. Port group 1.0 will represent user ports, group 2.0 will represent uplink ports.

```
B2(su)->set cos port-config irl 1.0 name Users ports fe.1.1-46
B2(su)->set cos port-config irl 2.0 name Uplink ports fe.1.47-48
```

show cos port-config

Use this command to show CoS port groups and the assigned ports.

Syntax

show cos port-config [**irl**|**flood-ctrl** [*group-type-index*]]

Parameters

irl	(Optional) Specifies that inbound rate limiting configuration information should be displayed.
flood-ctrl	(Optional) Specifies that flood control rate configuration information should be displayed.
group-type-index	(Optional) Show assigned ports for a specific port group. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.

Defaults

The **show cos port-config** command by itself will show all Port Groups.

Mode

Switch command, read-only.

Example

This example shows all inbound rate limiting port groups. Note that ports fe.1.1 through fe.1.48 were removed from the default port group 0.0 when they were added to port groups 1.0 and 2.0.

```
B2(su)->show cos port-config irl

Inbound Rate Limiting Port Configuration Entries
-------------------------------------------------------------------------
Port Group Name  :Default
Port Group       :0
Port Type        :0
Assigned Ports   :none
-------------------------------------------------------------------------
Port Group Name  :Users
Port Group       :1
Port Type        :0
Assigned Ports   :fe.1.1-46
-------------------------------------------------------------------------
Port Group Name  :Uplink
Port Group       :2
Port Type        :0
Assigned Ports   :fe.1.47-48
-------------------------------------------------------------------------
```

clear cos port-config

Use this command to clear CoS port groups or assigned ports.

Syntax

clear cos port-config {**irl**|**flood-ctrl**} {**all** | *group-type-index* [**entry**] | [**name**] [**ports**]}

Parameters

irl	Clear an IRL port group configuration.
flood-ctrl	Clear a flood control port group configuration.
all	Clear all inbound rate limiting port-config non-default entries.
group-type-index	Delete a specific port group or group name, or clear the ports from that group. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
entry	Delete this non-default inbound rate limiter entry.
name	Clear the administratively assigned textual description of this port group entry to its default.
ports	Clear the ports assigned to this group to its default.

Defaults

None.

Mode

Switch command, read-write.

Usage

The default port group 0.0 cannot be deleted.

Example

This example deletes all IRL Port Groups except for the Default group 0.0:

```
B2(su)->clear cos port-config irl all
```

set cos port-resource irl

Use this command to set the inbound rate limit parameters for a specific IRL resource for a specific port group.

Syntax

set cos port-resource irl *group-type-index irl-index* {[**unit** {**kbps**}] [**rate** *rate*] [**type** {**drop**}]}[**syslog enable** | **disable**] [**trap enable**|**disable**]

Parameters

group-type-index	Specifies an inbound rate limiting port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
irl-index	Index number of the inbound rate limiter resource associated with this entry. Valid values range from 0 to 99.
unit	Unit of measure for the inbound rate limiter (only option is Kbps).
kbps	Kilobits per second.
rate *rate*	Data rate for this inbound rate limiter. This is the actual rate limit. Valid values range from 512 to 1,000,000 Kbps for a Gigabit port.
type drop	Action for the rate limiter. The only action option is drop the frame if all limiters are exceeded.
syslog enable|**disable**	Enable or disable reporting a syslog entry if limiters are exceeded.
trap enable|**disable**	Enable or disable sending a trap if limiters are exceeded.

Defaults

None.

Mode

Switch command, read-write.

Usage

CoS port resources are where actual physical rate limiters are configured. Resources map directly to the number of rate limiters supported by the port type. (Port type 0 supports 100 IRL resources.) Resources exist for each port group and are indexed as **group#.port-type.irl-index**. Port resources are not initially configured as rate limiting.

Inbound rate limiting, or rate policing, simply drops or clips traffic inbound if a configured rate is exceeded. CoS inbound rate limiting allows the user to configure rate limits based on kilobits per second.

The show cos port-resource command displays the resources available for each port group. By default, no IRL resources are configured. The default Rate Limiting algorithm is drop and cannot be configured otherwise.

Example

This example sets the inbound rate limit resource index number 1 for port group 2.0 to 10000 Kbps or 1 MB:

```
B2(su)->set cos port-resource irl 2.0 1 unit kbps rate 10000 type drop
```

set cos port-resource flood-ctrl

Use this command to create a CoS-based flood control port resource. This resource specifies flood control rate limiters that can be mapped to specific ports.

Syntax

set cos port-resource flood-ctrl *group-type-index* {**unicast** | **multicast** | **broadcast** | **all**} **rate** *rate*

Parameters

group-type-index	Specifies a port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
unicast	Specifies rate limiting will be applied to unknown unicast traffic.
multicast	Specifies rate limiting will be applied to multicast traffic.
broadcast	Specifies rate limiting will be applied to broadcast traffic.
all	Specifies rate limiting will be applied to unknown unicast, multicast, and broadcast traffic.
rate *rate*	Specifies a rate limit in packets per second.

Defaults

None.

Mode

Switch command, read-write.

Usage

CoS port resources are where actual physical rate limiters are configured. This command can be used to create up to three different flood control limit resources for the port-type index of 0. The resources are assigned to specific ports with the **set cos port-config** command.

Example

This example creates a port resource broadcast rate limiter of 5 packets per second for the port group type index of 1.0 (group # 1 of port-type index 0).

```
B2(su)->set cos port-resource flood-ctrl 1.0 broadcast rate 5
```

show cos port-resource

Use this command to display the configured port resources.

Syntax

show cos port-resource [**irl** [*group-type-index* [*irl-index*]]] | [**flood-ctrl** [*group-type-index*]]

Parameters

irl	(Optional) Specifies that inbound rate limiting port resources should be displayed.
flood-ctrl	(Optional) Specifies that flood control port resources should be displayed.
group-type-index	(Optional) Specifies a port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
irl-index	(Optional) Inbound rate limiter resource index configured for the specified port group. Valid values range from 0 to 99.

Defaults

If **irl** or **flood-ctrl** are not specified, all port resources are shown.

If a port group and IRL index are not specified, the IRL configuration for all resources (0-99) for all configured port groups will be shown.

If a port group is not specified with the **flood-ctrl** parameter, flood control resources for all configured port groups will be shown.

Mode

Switch command, read-only.

Examples

This example displays the IRL resource index number 1 configuration for group 2.0.

```
B2(su)->show cos port-resource irl 2.0 1

'?' after the rate value indicates an invalid rate value

Group Index Resource Type Unit    Rate      Rate Limit Type Action
```

```
----------- -------- ---- ---- ----------   --------------- ------
2.0         1        irl  kbps 10000        drop             none
```

This example displays the flood control resources configured for group 0.0.

```
B2(su)->show cos port-resource flood-ctrl 0.0

'?' after the rate value indicates an invalid rate value

Group      Resource       Type       Unit     Rate       Rate Limit       Action
Index                                                        type
---------  -----------   ----------   ----   ----------  ---------------   ------
0.0        ucast         flood-ctrl    pps     disable     drop              none
0.0        mcast         flood-ctrl    pps     disable     drop              none
0.0        bcast         flood-ctrl    pps     disable     drop              none
```

clear cos port-resource irl

Use this command to clear inbound rate limit resources to default values.

Syntax

clear cos port-resource irl {**all** | *group-type-index* [*irl-index* [**unit**] [**rate**] [**type**]]}

Parameters

all	Clear all IRL resources for all port groups.
group-type-index	Specifies an inbound rate limiting port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
irl-index	(Optional) Inbound rate limiter resource index associated with the specified port group. Valid values range from 0 to 99.
unit	Clear the unit of measure for the inbound rate limiter.
rate	Clear the data rate for this inbound rate limiter.
type	Clear the action for the rate limiter.

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears the data rate to 0 for IRL resource index 1 for group 2.0.

```
B2(su)->clear cos port-resource irl 2.0 1 rate
```

clear cos port-resource flood-ctrl

Use this command to clear flood control port resources to default values.

Syntax

clear cos port-resource flood-ctrl {**all** | *group-type-index* {**unicast** | **multicast** | **broadcast** | **all** [**rate**]}}

Parameters

all	Clear all flood control resources for all port groups.
group-type-index	Specifies a port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
unicast	Clear unicast port resources for the specified port group.
multicast	Clear multicast port resources for the specified port group.
broadcast	Clear broadcast port resources for the specified port group.
all	Clear all flood control port resources for the specified port group.
rate	(Optional) Clear the data rate limiter of the specified type of port resource to the default (none or disabled).

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears the unicast port resource for port group 1.0 to default values.

```
B2(su)->clear cos port-resource flood-ctrl 1.0 unicast
```

set cos reference

Use this command to set the Class of Service inbound rate limiting reference configuration.

Syntax

set cos reference irl *group-type-index reference* **rate-limit** *irl-index*

Parameters

irl	Specifies that an IRL reference is being configured.
group-type-index	Specifies an inbound rate limiting port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
reference	IRL reference number associated with this entry.
rate-limit *irl-index*	Rate limiter (IRL resource index) to bind this reference to. Valid values range from 0 to 99.

Defaults

None.

Mode

Switch command, read-write.

Usage

The CoS reference table maps the user-defined IRL references found in the CoS settings table (see "set cos settings" on page 12-22) to rate limiters created in the port resource table (see "set cos port-resource irl" on page 12-27). The CoS reference table indexes can be thought of as virtual rate limiters. The table accounts for the maximum number of rate limiters supported by the device. The virtual limiters then map to the physical rate limiters. The CoS IRL Reference Table is not configured by default.

The CoS IRL reference table uses 100 indexes or virtual rate limiters, and maps each virtual limiter to a physical limiter or resource. An IRL reference table exists for each port group configured, and is indexed similarly to port resources, as port group#, port-type, reference. IRL references are not populated with limiters (resources), but can be configured by the user. The IRL reference table can be displayed using the show cos reference command.

Example

In the CoS IRL reference mapping table for port groups 1.0 and 2.0, create a reference for the IRL resource number 1 created for each group. The reference number 1 is used.

```
B2(su)->set cos reference irl 1.0 1 rate-limit 1
B2(su)->set cos reference irl 2.0 1 rate-limit 1
```

show cos reference

Use this command to show the Class of Service inbound rate limiting reference configuration.

Syntax

show cos reference [**irl** [*group-type-index*]]

Parameters

irl	(Optional) Specifies that inbound rate limiting reference information should be displayed.
group-type-index	(Optional) Specifies an inbound rate limiting port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.

Defaults

If **irl** is not specified, all CoS reference information is displayed.

If a specific port group is not specified, information for all port groups is displayed.

Mode

Switch command, read-only.

Example

This example shows the Class of Service IRL references for port group 1.0. Note that not all of the 100 possible references are displayed in this output example.

```
B2(su)->show cos reference irl 1.0

Group Index Reference Type Rate Limiter
----------- --------- ---- ------------
1.0         0         irl  none
1.0         1         irl  1
1.0         2         irl  none
1.0         3         irl  none
...
1.0         97        irl  none
1.0         98        irl  none
1.0         99        irl  none
```

clear cos reference

Use this command to clear the Class of Service inbound rate limiting reference configuration.

Syntax

clear cos reference irl {**all** | *group-type-index reference*}

Parameters

irl	Specifies that IRL references are being cleared.
all	Clear all groups indexes and references.

group-type-index	Specifies an inbound rate limiting port group/type index. Valid entries are in the form of **group#.port-type**. Valid values for group# can range from 0 to 7. Valid values for port-type can range from 0 to 1, although only port type 0 is currently supported. For example, port group 3 would be specified as **3.0**.
reference	Clear a specific reference for the specified port group.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the CoS inbound rate limiting reference configuration for all groups:

```
B2(su)->clear cos reference irl all
```

show cos unit

Use this command to show possible CoS unit entries.

Syntax

show cos unit [**irl** [**port-type** *index*] [**kbps**]] [**flood-ctrl** [**port-type** *index*] [**pps**]]

Parameters

irl	(Optional) Display only IRL unit information.
port-type *index*	(Optional) Display information about the specified port type. (Only port-type index 0 is supported.)
kbps	(Optional) Display kbps information.
flood-ctrl	(Optional) Display only flood control unit information.
pps	(Optional) Display pps information.

Defaults

If no parameters are entered, all Cos unit information is displayed.

Mode

Switch command, read-only.

Examples

This example shows possible unit entries for inbound rate limiting:

```
B2(su)->show cos unit irl

Type:                           Unit:
irl = inbound rate limiting     Kbps  = Kilobits per second
```

```
Port Type  Type  Unit  Maximum Rate  Minimum Rate  Granularity
---------  ----  ----  ------------  ------------  -----------
0          irl   Kbps  1000000       64            1
```

This examples shows flood control unit information.

```
B2(su)->show cos unit flood-ctrl

Type:                                  Unit:
flood-ctrl = flood control type        pps  = packets per second

Port Type       Type         Unit  Maximum Rate  Minimum Rate  Granularity
-----------     -----------  ----  ------------  ------------  -----------
0               flood-ctrl   pps   148810        0             1
```

clear cos all-entries

Use this command to clear all Class of Service entries except entries 0-7.

Syntax

clear cos all-entries

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the CoS configuration for all entries except entries 0-7:

```
B2(su)->clear cos all-entries
```

show cos port-type

Use this command to display Class of Service port type configurations.

Syntax

show cos port-type [**irl** [*port-type*]] [**flood-ctrl** [*port-type*]]

Parameters

irl	(Optional) Displays inbound rate limiting information.
flood-ctrl	(Optional) Displays flood control information.
port-type	(Optional) Displays information for a specific port type. (Only port type 0 is supported.)

Defaults

If no parameters are specified, inbound rate limiting and flood controlinformation for all port types is displayed.

Mode

Switch command, read-only.

Usage

The B2 implementation provides one default port type (0) for designating available inbound rate limiting or flood control resources. Port type 0 includes all ports.

The port type 0 IRL description is “C2 100 IRL,” which indicates that this port type provides a maximum of 100 inbound rate limiting resources per port group. The port type 0 flood control description is “C2 3 flood-ctrl” which indicates that this port type provides a maximum of 3 flood control resources per port group.

Examples

This example shows inbound rate limiting information for port type 0.

```
B2(su)->show cos port-type irl 0

Number of resources:             Supported rate types:
irl = inbound rate limiter(s)    Kbps  = kilobits per second

       Port type     Number of  Supported  Eligible          Unselected
Index  description   limiters   rate type  ports             ports
-----  ------------  ---------  ---------  ----------------  ----------------
0      C2 100 IRL    100        kbps       fe.1.1-48         fe.1.1-4
```

This example shows flood control information for port type 0.

```
B2(su)->show cos port-type flood-ctrl 0

Number of resources:               Supported rate types:
flood-ctrl = flood control type    Pps  = Packets per second

       Port type      Number of  Supported  Eligible          Unselected
Index  description    limiters   rate type  ports             ports
-----  ------------   ---------  ---------  ----------------  ------------
0      C2 3 flood-ctrl   3        pps       fe.1.1-24         fe.1.1-24
```

13

Port Priority and Rate Limiting Configuration

This chapter describes the Port Priority and Rate Limiting set of commands and how to use them.

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Port Priority Configuration Summary

The SecureStack B2 device supports Class of Service (CoS), which allows you to assign mission-critical data to higher priority through the device by delaying less critical traffic during periods of congestion. The higher priority traffic through the device is serviced first before lower priority traffic. The Class of Service capability of the device is implemented by a priority queueing mechanism. Class of Service is based on the IEEE 802.1D (802.1p) standard specification, and allows you to define eight priorities (0 through 7) and assign them to transmit queues for each port.

A priority 0 through 7 can be set on each port, with 0 being the lowest priority. A port receiving a frame without priority information in its tag header is assigned a priority according to the default priority setting on the port. For example, if the priority of a port is set to 4, the frames received through that port without a priority indicated in their tag header are classified as a priority 4 and transmitted according to that priority. In addition, the device's rate limiting capabilities allow you to further prioritize traffic by limiting the rate of inbound traffic on a per port/priority basis.

Note: When CoS override is enabled using the **set policy profile** command as described in "set policy profile" on page 12-3, CoS-based classification rules will take precedence over priority settings configured with the **set port priority** command described in this section.

Configuring Port Priority

Purpose

To view or configure port priority characteristics as follows:

- Display or change the port default Class-of Service (CoS) transmit priority (0 through 7) of each port for frames that are received (ingress) without priority information in their tag header.

- Display the current traffic class mapping-to-priority of each port.
- Set each port to transmit frames according to 802.1D (802.1p) priority set in the frame header.

Commands

For information about...	Refer to page...
show port priority	13-4
set port priority	13-2
clear port priority	13-3

show port priority

Use this command to display the 802.1D priority for one or more ports.

Syntax

show port priority [*port-string*]

Parameters

port-string	(Optional) Displays priority information for a specific port. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, priority for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the port priority for the fe.2.1 through 5.

```
B2(su)->show port priority fe.2.1-5
fe.2.1 is set to 0
fe.2.2 is set to 0
fe.2.3 is set to 0
fe.2.4 is set to 0
fe.2.5 is set to 0
```

set port priority

Use this command to set the 802.1D (802.1p) Class-of-Service transmit priority (0 through 7) on each port. A port receiving a frame without priority information in its tag header is assigned a priority according to the priority setting on the port. For example, if the priority of a port is set to 5, the frames received through that port without a priority indicated in their tag header are classified as a priority 5.

A frame with priority information in its tag header is transmitted according to that priority.

Syntax

set port priority *port-string priority*

Parameters

port-string	Specifies the port for which to set priority. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
priority	Specifies a value of **0 to 7** to set the CoS priority for the port entered in the *port-string*. Priority value of 0 is the lowest priority.

Defaults

None.

Mode

Switch command, read-write.

Usage

The **set port priority** command will not change the 802.1p priority tag on tagged traffic with a default priority tag. The command only has an effect on how untagged traffic will be prioritized as it passes internally through the device.

Example

This example shows how to set a default priority of 6 on fe.1.3. Frames received by this port without priority information in their frame header are set to the default setting of 6:

```
B2(su)->set port priority fe.1.3 6
```

clear port priority

Use this command to reset the current CoS port priority setting to 0. This will cause all frames received without a priority value in its header to be set to priority 0.

Syntax

clear port priority *port-string*

Parameters

port-string	Specifies the port for which to clear priority. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset fe.1.11 to the default priority:

```
B2(rw)->clear port priority fe.1.11
```

Configuring Priority to Transmit Queue Mapping

Purpose

To perform the following:

- View the current priority to transmit queue mapping of each physical port.
- Configure each port to either transmit frames according to the port priority, set using the **set port priority** command described in "set port priority" on page 13-2, or according to a priority based on a percentage of port transmission capacity, assigned to transmit queues using the **set port txq** command described in "set port txq" on page 13-7.
- Clear current port priority queue settings for one or more ports.

Commands

For information about...	Refer to page...
show port priority-queue	13-4
set port priority-queue	13-5
clear port priority-queue	13-6

show port priority-queue

Use this command to display the port priority levels (0 through 7, with 0 as the lowest level) associated with the current transmit queues (0 being the lowest priority) for each selected port. A frame with a certain port priority is transmitted according to the settings entered using the **set port priority-queue** command described in "set port priority-queue" on page 13-5.

Syntax

show port priority-queue [*port-string*]

Parameters

port-string	(Optional) Displays the mapping of priorities to transmit queues for one or more ports.

Defaults

If *port-string* is not specified, priority queue information for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display priority queue information for fe.1.1. In this case, frames with a priority of 0 are associated with transmit queue 1; frames with 1 or 2 priority, are associated with transmit queue 0; and so forth:

```
B2(su)->show port priority-queue ge.1.1
 Port     P0 P1 P2 P3 P4 P5 P6 P7
--------- -- -- -- -- -- -- -- --
ge.1.1    1  0  0  2  3  4  5  5
```

set port priority-queue

Use this command to map 802.1D (802.1p) priorities to transmit queues. This enables you to change the transmit queue (0 to 7, with 0 being the lowest priority queue) for each port priority of the selected port. You can apply the new settings to one or more ports.

Syntax

`set port priority-queue` *`port-string priority queue`*

Parameters

port-string	Specifies the port(s) for which to set priority-to-queue mappings. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
priority	Specifies a value of **0** through **7** (0 is the lowest level) that determines what priority frames will be transmitted on the transmit queue entered in this command.
queue	Specifies a value of **0** through **5** (0 is the lowest level) that determines the queue on which to transmit the frames with the port priority entered in this command. **Note:** Although there are 8 queues, only queues 0 through 5 may be configured. Queues 6 and 7 are reserved for management traffic.l

Defaults

None.

Mode

Switch command, read-write.

Usage

Priority to transmit queue mapping on an individual port basis can only be configured on Gigabit Ethernet ports (`ge.x.x`). On switches that provide Fast Ethernet ports, when you use the **set port priority-queue** command to configure a Fast Ethernet port (`fe.x.x`), the mapping values are applied globally to all Fast Ethernet ports on the system.

Example

This example shows how to set priority 5 frames received on `ge.2.12` to transmit on queue 0.

```
B2(su)->set port priority-queue ge.2.12 5 0
```

clear port priority-queue

Use this command to reset port priority queue settings back to defaults for one or more ports.

Syntax

clear port priority-queue *port-string*

Parameters

port-string	Specifies the port for which to clear priority-to-queue mappings. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the priority queue settings on fe.2.12:

```
B2(su)->clear port priority-queue fe.2.12
```

Configuring Quality of Service (QoS)

Purpose

Eight transmit queues are implemented in the switch hardware for each port. The commands in this section allow you to set the priority mode and weight for each of the available queues (0 through 7) for each physical port on the switch. Priority mode and weight cannot be configured on LAGs, only on the physical ports that make up the LAG.

Commands

For information about...	Refer to page...
show port txq	13-6
set port txq	13-7
clear port txq	13-8

show port txq

Use this command to display QoS transmit queue information for one or more physical ports.

Syntax

show port txq [*port-string*]

Parameters

port-string	(Optional) Specifies port(s) for which to display QoS settings. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2. Only physical ports will be displayed. LAG ports have no transmit queue information.

Defaults

If the *port-string* is not specified, the QoS setting of all physical ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display the current algorithm and transmit queue weights configured on port fe.1.10:

```
B2(su)->show port txq fe.1.10
Port    Alg  Q0  Q1  Q2  Q3  Q4  Q5  Q6  Q7
-----   --- --- --- --- --- --- --- --- ---

fe.1.10 WRR 10   10  15  20  25  20  0   0
```

set port txq

Use this command to set QoS transmit queue arbitration values for physical ports.

Syntax

`set port txq` *`port-string value0 value1 value2 value3 value4 value5 value6 value7`*

Parameters

port-string	Specifies port(s) on which to set queue arbitration values. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2. Only physical ports can be configured with this command. LAG ports cannot be configured.
value0 - value7	Specifies percentage to allocate to a specific transmit queue. The values must total 100 percent.

Defaults

None.

Mode

Switch command, read-write.

Usage

Queues can be set for strict priority (SP) or weighted round-robin (WRR). If set for WRR mode, weights may be assigned to those queues with this command. Weights are specified in the range of 0 to 100 percent. Weights specified for queues 0 through 7 on any port must total 100 percent.

Examples

This example shows how to change the arbitration values for the eight transmit queues belonging to fe.1.1:

```
B2(su)->set port txq fe.1.1 10 10 10 10 10 10 10 30
```

This example shows how to change the algorithm to strict priority for the eight transmit queues belonging to fe.1.1:

```
B2(su)->set port txq fe.1.1 0 0 0 0 0 O O 100
B2(su)->show port txq fe.1.1
Port    Alg  Q0  Q1  Q2  Q3  Q4  Q5  Q6  Q7
-----    --- --- --- --- --- --- --- --- ---

fe.1.1  STR SP  SP  SP  SP  SP  SP  SP  SP
```

clear port txq

Use this command to clear port transmit queue values back to their default values.

Syntax

clear port txq *port-string*

Parameters

port-string	Clears transmit queue values on specific port(s) back to their default values. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2. Only physical ports can be configured with this command. LAG ports cannot be configured.

Defaults

By default, transmit queues are defined as follows:

Queue	Mode	Weight	Queue	Mode	Weight
0	WRR	1	4	WRR	5
1	WRR	2	5	WRR	6
2	WRR	3	6	WRR	7
3	WRR	4	7	WRR	8

Mode

Switch command, read-write.

Example

This example shows how to clear transmit queue values on fe.1.1:

```
B2(su)->clear port txq fe.1.1
```

Configuring Port Traffic Rate Limiting

Purpose

To limit the rate of inbound traffic on the SecureStack B2 device on a per port/priority basis. The allowable range for the rate limiting is 64 kilobytes per second minimum up to the maximum transmission rate allowable on the interface type.

Rate limit is configured for a given port and list of priorities. The list of priorities can include one, some, or all of the eight 802.1p priority levels. Once configured, the rate of all traffic entering the port with the priorities configured to that port is not allowed to exceed the programmed limit. If the rate exceeds the programmed limit, frames are dropped until the rate falls below the limit.

Commands

The commands to configure traffic rate limiting are listed below.

For information about...	Refer to page...
show port ratelimit	13-10
set port ratelimit	13-12
clear port ratelimit	13-13

show port ratelimit

Use this command to show the traffic rate limiting configuration on one or more ports.

Syntax

show port ratelimit [*port-string*]

Parameters

port-string	(Optional) Displays rate limiting information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, rate limiting information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display the current rate limiting information for fe.2.1:

```
B2(su)->show port ratelimit fe.2.1
Global Ratelimiting status is disabled.

    Port            Threshold                                  Priority
   Number    Index   (kB/s)       Action     Direction          List      Status
-----------  -----  ---------  ------------  ---------  -----------  --------
fe.2.1           1    64          discard    inbound              0    disabled
fe.2.1           2    64          discard    inbound              0    disabled
fe.2.1           3    64          discard    inbound              0    disabled
fe.2.1           4    64          discard    inbound              0    disabled
fe.2.1           5    64          discard    inbound              0    disabled
fe.2.1           6    64          discard    inbound              0    disabled
fe.2.1           7    64          discard    inbound              0    disabled
fe.2.1           8    64          discard    inbound              0    disabled
```

Table 13-32 shows a detailed explanation of the command output.

Table 13-32 show port ratelimit Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to “Port String Syntax Used in the CLI” on page 7-2.
Index	Resource index for this port.
Threshold (kB/s)	Port rate limiting threshold in kilobytes per second.
Action	Whether or not frames not conforming to rate limiting will be discarded.
Direction	Currently rules can only be applied to inbound traffic.
Priority List	802.1D (802.1p) port priority level.
Status	Whether or not this rule is active or disabled.

set port ratelimit

Use this command to configure the traffic rate limiting status and threshold (in kilobytes per second) for one or more ports.

Syntax

```
set port ratelimit {disable | enable} | port-string priority threshold
{disable | enable} [inbound] [index]
```

Parameters

disable | **enable**	When entered without a *port-string*, globally disables or enables the port rate limiting function. When entered with a *port-string*, disables or enables rate limiting on specific port(s) when the global function is enabled.
port-string	Specifies a port on which to set the rate limiting threshold and other parameters. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
priority	Specifies the 802.1D (802.1p) port priority level associated with the *port-string*. The value can be **0** to **7**, with 0 specifying the lowest priority.
threshold	Specifies a port rate limiting threshold in kilobytes per second. Range is **64** up to a maximum of **2,147,483,647** kilobytes per second.
inbound	(Optional) Applies this rate policing rule to inbound traffic.
index	(Optional) Assigns a resource index for this port.

Defaults

Threshold will be applied to inbound traffic on the port/priority.

If *index* is not specified, settings will be applied to index 1, and will overwrite index 1 for any subsequent rate limits configured.

Mode

Switch command, read-write.

Example

This example shows how to:

- globally enable rate limiting
- configure rate limiting for inbound traffic on port fe.2.1, index 1, priority 5, to a threshold of 125 KBps:

```
B2(rw)->set port ratelimit enable
B2(rw)->set port ratelimit fe.2.1 5 125 enable inbound
```

clear port ratelimit

Use this command to clear rate limiting parameters for one or more ports.

Syntax

clear port ratelimit *port-string* [*index*]

Parameters

port-string	Specifies the port(s) on which to clear rate limiting. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
index	(Optional) Specifies the associated resource index to be reset.

Defaults

If not specified, all *index* entries will be reset.

Mode

Switch command, read-write.

Example

This example shows how to clear all rate limiting parameters on port fe.2.1.

```
B2(su)->clear port ratelimit fe.2.1
```

14

IGMP Configuration

This chapter describes the IGMP Configuration set of commands and how to use them.

For information about...	Refer to page...
IGMP Overview	14-1
Configuring IGMP at Layer 2	14-2

IGMP Overview

About IP Multicast Group Management

The Internet Group Management Protocol (IGMP) runs between hosts and their immediately neighboring multicast device. The protocol's mechanisms allow a host to inform its local device that it wants to receive transmissions addressed to a specific multicast group.

A multicast-enabled device can periodically ask its hosts if they want to receive multicast traffic. If there is more than one device on the LAN performing IP multicasting, one of these devices is elected "querier" and assumes the responsibility of querying the LAN for group members.

Based on the group membership information learned from IGMP, a device can determine which (if any) multicast traffic needs to be forwarded to each of its ports. At Layer-3, multicast devices use this information, along with a multicast routing protocol, to support IP multicasting across an IP network.

IGMP provides the final step in an IP multicast packet delivery service, since it is only concerned with forwarding multicast traffic from the local device to group members on a directly attached subnetwork or LAN segment.

This device supports IP multicast group management by passively snooping on the IGMP query and IGMP report packets transferred between IP multicast devices and IP multicast host groups to learn IP multicast group members.

The purpose of IP multicast group management is to optimize a switched network's performance so multicast packets will only be forwarded to those ports containing multicast group hosts or multicast devices instead of flooding to all ports in the subnet (VLAN).

About Multicasting

Multicasting is used to support real-time applications such as video conferences or streaming audio. A multicast server does not have to establish a separate connection with each client. It merely broadcasts its service to the network, and any hosts that want to receive the multicast register with their local multicast switch/router. Although this approach reduces the network overhead required by a multicast server, the broadcast traffic must be carefully pruned at every

multicast switch/router it passes through to ensure that traffic is only passed to the hosts that subscribed to this service.

Configuring IGMP at Layer 2

Purpose

To configure IGMP snooping from the switch CLI.

Commands

For information about...	Refer to page...
show igmpsnooping	14-2
set igmpsnooping adminmode	14-3
set igmpsnooping interfacemode	14-3
set igmpsnooping groupmembershipinterval	14-4
set igmpsnooping maxresponse	14-5
set igmpsnooping mcrtrexpiretime	14-5
set igmpsnooping add-static	14-6
set igmpsnooping remove-static	14-7
show igmpsnooping static	14-7
show igmpsnooping mfdb	14-8
clear igmpsnooping	14-8

show igmpsnooping

Use this command to display IGMP snooping information.

Syntax

```
show igmpsnooping
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Usage

Configured information is displayed whether or not IGMP snooping is enabled. Status information is displayed only when the function is enabled. For information on enabling IGMP on

the system, refer to "set igmpsnooping adminmode" on page 14-3. For information on enabling IGMP on one or more ports, refer to "set igmpsnooping interfacemode" on page 14-3.

Example

This example shows how to display IGMP snooping information:

```
B2(su)->show igmpsnooping
Admin Mode..................................... Enable
Group Membership Interval...................... 260
Max Response Time.............................. 100
Multicast Router Present Expiration Time....... 0
Interfaces Enabled for IGMP Snooping........... fe.1.1,fe.1.2,fe.1.3
Multicast Control Frame Count.................. 0
Data Frames Forwarded by the CPU............... 0
```

set igmpsnooping adminmode

Use this command to enable or disable IGMP on the system.

Syntax

set igmpsnooping adminmode {**enable** | **disable**}

Parameters

enable | **disable**	Enables or disables IGMP snooping on the system.

Defaults

None.

Mode

Switch command, read-write.

Usage

In order for IGMP snooping to be enabled on one or all ports, it must be globally enabled on the device with this command, and then enabled on a port(s) using the **set igmpsnooping interface mode** command as described in "set igmpsnooping interfacemode" on page 14-3.

Note: IGMP snooping cannot be controlled via WebView.

Example

This example shows how to enable IGMP on the system:

```
B2(su)->set igmpsnooping adminmode enable
```

set igmpsnooping interfacemode

Use this command to enable or disable IGMP on one or all ports.

Syntax

set igmpsnooping interfacemode *port-string* **{enable | disable}**

Parameters

port-string	Specifies one or more ports on which to enable or disable IGMP.
enable | **disable**	Enables or disables IGMP.

Defaults

None.

Mode

Switch command, read-write.

Usage

In order for IGMP snooping to be enabled on one or all ports, it must be globally enabled on the device using the **set igmpsnooping adminmode** command as described in "set igmpsnooping adminmode" on page 14-3, and then enabled on a port(s) using this command.

Example

This example shows how to enable IGMP on port fe.1.10:

```
B2(su)->set igmpsnooping interfacemode fe.1.10 enable
```

set igmpsnooping groupmembershipinterval

Use this command to configure the IGMP group membership interval time for the system.

Syntax

set igmpsnooping groupmembershipinterval *time*

Parameters

time	Specifies the IGMP group membership interval. Valid values are **2 - 3600** seconds. This value works together with the **set igmpsnooping maxresponsetime** command to remove ports from an IGMP group and must be greater than the max response time value.

Defaults

None.

Mode

Switch command, read-write.

Usage

The IGMP group membership interval time sets the frequency of host-query frame transmissions and must be greater than the IGMP maximum response time as described in "set igmpsnooping maxresponse" on page 14-5.

Example

This example shows how to set the IGMP group membership interval to 250 seconds:

```
B2(su)->set igmpsnooping groupmembershipinterval 250
```

set igmpsnooping maxresponse

Use this command to configure the IGMP query maximum response time for the system.

Syntax

set igmpsnooping maxresponse *time*

Parameters

time	Specifies the IGMP maximum query response time. Valid values are **100 - 255** seconds. The default value is 100 seconds. This value works together with the **set igmpsnooping groupmembershipinterval** command to remove ports from an IGMP group and must be lesser than the group membership interval value.

Defaults

None.

Mode

Switch command, read-write.

Usage

This value must be less than the IGMP maximum response time described in "set igmpsnooping groupmembershipinterval" on page 14-4.

Example

This example shows how to set the IGMP maximum response time to 100 seconds:

```
B2(su)->set igmpsnooping maxresponse 100
```

set igmpsnooping mcrtrexpiretime

Use this command to configure the IGMP multicast router expiration time for the system.

Syntax

set igmpsnooping mcrtrexpire *time*

Parameters

time	Specifies the IGMP multicast router expiration time. Valid values are **0 - 3600** seconds. A value of 0 will configure the system with an infinite expiration time. The default value is 0.

Defaults

None.

Mode

Switch command, read-write.

Usage

This timer is for expiring the switch from the multicast database. If the timer expires, and the only address left is the multicast switch, then the entry will be removed.

Example

This example shows how to set the IGMP multicast router expiration time to infinity:

```
B2(su)->set igmpsnooping mcrtrexpiretime 0
```

set igmpsnooping add-static

This command creates a new static IGMP entry or adds one or more new ports to an existing entry.

Syntax

set igmpsnooping add-static *group vlan-list* [**modify**] [*port-string*]

Parameters

group	Specifies the multicast group IP address for the entry.
vlan-list	Specifies the VLANs on which to configure the entry.
modify	(Optional) Adds the specified port or ports to an existing entry.
port-string	(Optional) Specifies the port or ports to add to the entry.

Defaults

If no ports are specified, all ports are added to the entry.

If **modify** is not specified, a new entry is created.

Mode

Switch command, read-write.

Usage

Use this command to create and configure Layer 2 IGMP entries.

Example

This example creates an IGMP entry for the multicast group with IP address of 233.11.22.33 configured on VLAN 20 configured with the port fe.1.1.

```
B2(su)->set igmpsnooping add-static 233.11.22.33 20 fe.1.1
```

set igmpsnooping remove-static

This command deletes a static IGMP entry or removes one or more new ports from an existing entry.

Syntax

set igmpsnooping remove-static *group vlan-list* [**modify**] [*port-string*]

Parameters

group	Specifies the multicast group IP address of the entry.
vlan-list	Specifies the VLANs on which the entry is configured.
modify	(Optional) Removes the specified port or ports from an existing entry.
port-string	(Optional) Specifies the port or ports to remove from the entry.

Defaults

If no ports are specified, all ports are removed from the entry.

Mode

Switch command, read-write.

Example

This example removes port fe.1.1 from the entry for the multicast group with IP address of 233.11.22.33 configured on VLAN 20.

```
B2(su)->set igmpsnooping remove-static 233.11.22.33 20 fe.1.1
```

show igmpsnooping static

This command displays static IGMP ports for one or more VLANs or IGMP groups.

Syntax

show igmpsnooping static *vlan-list* [**group** group]

Parameters

vlan-list	Specifies the VLAN for which to display static IGMP ports.
group *group*	(Optional) Specifies the IGMP group for which to display static IGMP ports.

Defaults

If no group is specified, information for all groups is displayed.

Mode

Switch command, read-only.

Example

This example displays the static IGMP ports for VLAN 20.

```
B2(su)->show igmpsnooping static 20
--------------------------------------------------------------------------------
Vlan Id      = 20   Static Multicast Group Address = 233.11.22.33     Type = IGMP
IGMP Port List = fe.1.1
```

show igmpsnooping mfdb

Use this command to display multicast forwarding database (MFDB) information.

Syntax

show igmpsnooping mfdb [**stats**]

Parameters

stats	(Optional) Displays MFDB statistics.

Defaults

If **stats** is not specified, all MFDB table entries will be displayed.

Mode

Switch command, read-only.

Examples

This example shows how to display multicast forwarding database entries:

```
B2(su)->show igmpsnooping mfdb
MAC Address         Type      Description             Interfaces
--------------------  -------  ---------------  -------------------------
00:14:01:00:5E:02:CD:B0  Dynamic  Network Assist    Fwd: fe.1.1,fe.3.1,fe.4.1
00:32:01:00:5E:37:96:D0  Dynamic  Network Assist    Fwd: fe.4.7
00:32:01:00:5E:7F:FF:FA  Dynamic  Network Assist    Fwd: fe.4.7
```

This example shows how to display multicast forwarding database statistics:

```
B2(su)->show igmpsnooping mfdb stats
Max MFDB Table Entries..... 256
Most MFDB Entries Since Last Reset..... 1
Current Entries..... 0
```

clear igmpsnooping

Use this command to clear all IGMP snooping entries.

Syntax

clear igmpsnooping

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear all IGMP snooping entries:

```
B2(su)->clear igmpsnooping
Are you sure you want to clear all IGMP snooping entries? (y/n) y

IGMP Snooping Entries Cleared.
```

15

Logging and Network Management

This chapter describes switch-related logging and network management commands and how to use them.

Note: The commands in this chapter pertain to network management of the SecureStack B2 device from the **switch CLI** only.

For information about...	Refer to page...
Configuring System Logging	15-1
Monitoring Network Events and Status	15-12
Managing Switch Network Addresses and Routes	15-17
Configuring Simple Network Time Protocol (SNTP)	15-27
Configuring Node Aliases	15-35

Configuring System Logging

Purpose

To display and configure system logging, including Syslog server settings, Syslog default settings, and the logging buffer.

Commands

For information about...	Refer to page...
show logging server	15-2
set logging server	15-3
clear logging server	15-4
show logging default	15-4
set logging default	15-5
clear logging default	15-6
show logging application	15-6
set logging application	15-7

For information about...	Refer to page...
clear logging application	15-8
show logging local	15-9
set logging local	15-9
clear logging local	15-10
show logging buffer	15-10

show logging server

Use this command to display the Syslog configuration for a particular server.

Syntax

show logging server [*index*]

Parameters

index	(Optional) Displays Syslog information pertaining to a specific server table entry. Valid values are **1**-**8**.

Defaults

If *index* is not specified, all Syslog server information will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display Syslog server configuration information:

```
B2(ro)->show logging server

IP Address       Facility Severity        Description       Port Status
-------------------------------------------------------------------------
 1 132.140.82.111 local4 warning(5)        default         514 enabled
 2 132.140.90.84  local4 warning(5)        default         514 enabled
```

Table 15-33 provides an explanation of the command output.

Table 15-33 show logging server Output Details

Output Field	What It Displays...
IP Address	Syslog server's IP address. For details on setting this using the **set logging server** command, refer to "set logging server" on page 15-3.
Facility	Syslog facility that will be encoded in messages sent to this server. Valid values are: **local0** to **local7**.
Severity	Severity level at which the server is logging messages.
Description	Text string description of this facility/server.
Port	UDP port the client uses to send to the server.
Status	Whether or not this Syslog configuration is currently enabled or disabled.

set logging server

Use this command to configure a Syslog server.

Syntax

set logging server *index* [**ip-addr** *ip-addr*] [**facility** *facility*] [**severity** *severity*] [**descr** *descr*] [**port** *port*] [**state** {**enable** | **disable**}]

Parameters

index	Specifies the server table index number for this server. Valid values are **1** - **8**.
ip-addr *ip-addr*	(Optional) Specifies the Syslog message server's IP address.
facility *facility*	(Optional) Specifies the server's facility name. Valid values are: **local0** to **local7**.
severity *severity*	(Optional) Specifies the severity level at which the server will log messages. Valid values and corresponding levels are: **1** — emergencies (system is unusable) **2** — alerts (immediate action required) **3** — critical conditions **4** — error conditions **5** — warning conditions **6** — notifications (significant conditions) **7** — informational messages **8** — debugging messages
descr *descr*	(Optional) Specifies a textual string description of this facility/server.
port *port*	(Optional) Specifies the default UDP port the client uses to send to the server.
state enable | **disable**	(Optional) Enables or disables this facility/server configuration.

Defaults

If **ip-addr** is not specified, an entry in the Syslog server table will be created with the specified *index* number and a message will display indicating that no IP address has been assigned.

If not specified, **facility**, severity and port will be set to defaults configured with the **set logging default** command ("set logging default" on page 15-5).

If **state** is not specified, the server will not be enabled or disabled.

Mode

Switch command, read-write.

Example

This command shows how to enable a Syslog server configuration for index 1, IP address 134.141.89.113, facility local4, severity level 3 on port 514:

```
B2(su)->set logging server 1 ip-addr 134.141.89.113 facility local4 severity 3
port 514 state enable
```

clear logging server

Use this command to remove a server from the Syslog server table.

Syntax

clear logging server *index*

Parameters

index	Specifies the server table index number for the server to be removed. Valid values are **1** - **8**.

Defaults

None.

Mode

Switch command, read-write.

Example

This command shows how to remove the Syslog server with index 1 from the server table:

```
B2(su)->clear logging server 1
```

show logging default

Use this command to display the Syslog server default values.

Syntax

show logging default

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This command shows how to display the Syslog server default values. For an explanation of the command output, refer back to Table 15-33 on page 15-2.

```
B2(su)->show logging default

             Facility      Severity          Port
           ----------------------------------------
Defaults:     local4       warning(5)       514
```

set logging default

Use this command to set logging default values.

Syntax

set logging default {[**facility** *facility*] [**severity** *severity*] **port** *port*]}

Parameters

facility *facility*	Specifies the default facility name. Valid values are: **local0** to **local7.**
severity *severity*	Specifies the default logging severity level. Valid values and corresponding levels are: **1** — emergencies (system is unusable) **2** — alerts (immediate action required) **3** — critical conditions **4** — error conditions **5** — warning conditions **6** — notifications (significant conditions) **7** — informational messages **8** — debugging messages
port *port*	Specifies the default UDP port the client uses to send to the server.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the Syslog default facility name to local2 and the severity level to 4 (error logging):

```
B2(su)->set logging default facility local2 severity 4
```

clear logging default

Use this command to reset logging default values.

Syntax

```
clear logging default {[facility] [severity] [port]}
```

Parameters

facility	(Optional) Resets the default facility name to **local4.**
severity	(Optional) Resets the default logging severity level to **6** (notifications of significant conditions).
port	(Optional) Resets the default UDP port the client uses to send to the server to **514**.

Defaults

At least one optional parameter must be entered.

All three optional keywords must be entered to reset all logging values to defaults.

Mode

Switch command, read-write.

Example

This example shows how to reset the Syslog default severity level to 6:

```
B2(su)->clear logging default severity
```

show logging application

Use this command to display the severity level of Syslog messages for one or all applications configured for logging on your system.

Syntax

```
show logging application [mnemonic | all]
```

Parameters

mnemonic	(Optional) Displays severity level for one application configured for logging. Mnemonics will vary depending on the number and types of applications running on your system. Sample mnemonics and their corresponding applications are listed in Table 15-35 on page 15-8. **Note:** Mnemonic values are case sensitive and must be typed as they appear in Table 15-35.
all	(Optional) Displays severity level for all applications configured for logging.

Defaults

If no parameter is specified, information for all applications will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display system logging information pertaining to the SNMP application.

```
B2(ro)->show logging application SNMP

Application   Current Severity Level
-----------------------------------------
 90     SNMP                      6

1(emergencies)  2(alerts)       3(critical)
4(errors)       5(warnings)     6(notifications)
7(information)  8(debugging)
```

Table 15-34 provides an explanation of the command output.

Table 15-34 show logging application Output Details

Output Field	What it displays...
Application	A mnemonic abbreviation of the textual description for applications being logged.
Current Severity Level	Severity level at which the server is logging messages for the listed application. This range (from 1 to 8) and its associated severity list is shown in the CLI output. For a description of these entries, which are set using the **set logging application** command, refer to "set logging application" on page 15-7.

set logging application

Use this command to set the severity level of log messages for one or all applications.

Syntax

set logging application {[*mnemonic* | **all**]} [**level** *level*]

Parameters

mnemonic	Specifies a case sensitive mnemonic abbreviation of an application to be logged. This parameter will vary depending on the number and types of applications running on your system. To display a complete list, use the **show logging application** command as described in "show logging application" on page 15-6. Sample mnemonics and their corresponding applications are listed in Table 15-35 on page 15-8. **Note:** Mnemonic values are case sensitive and must be typed as they appear in Table 15-35.
all	Sets the logging severity level for all applications.

level *level*	(Optional) Specifies the severity level at which the server will log messages for applications. Valid values and corresponding levels are: **1** — emergencies (system is unusable) **2** — alerts (immediate action required) **3** — critical conditions **4** — error conditions **5** — warning conditions **6** — notifications (significant conditions) **7** — informational messages **8** — debugging messages

Table 15-35 Mnemonic Values for Logging Applications

Mnemonic	Application
CLIWEB	Command Line Interface and Webview management
SNMP	Simple Network Management Protocol
STP	Spanning Tree Protocol
Driver	Hardware drivers
System	Non-application items such as general chassis management
Stacking	Stacking management (if applicable)
UPN	User Personalized Networking
Router	Router

Defaults

If **level** is not specified, none will be applied.

Mode

Switch command, read-write.

Example

This example shows how to set the severity level for SNMP to 4 so that error conditions will be logged for that application.

```
B2(rw)->set logging application SNMP level 4
```

clear logging application

Use this command to reset the logging severity level for one or all applications to the default value of 6 (notifications of significant conditions).

Syntax

clear logging application {*mnemonic* | **all**}

Parameters

mnemonic	Resets the severity level for a specific application to 6. Valid mnemonic values and their corresponding applications are listed in Table 15-35 on page 15-8.
all	Resets the severity level for all applications to 6.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the logging severity level to 6 for SNMP.

```
B2(rw)->clear logging application SNMP
```

show logging local

Use this command to display the state of message logging to the console and a persistent file.

Syntax

```
show logging local
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the state of message logging. In this case, logging to the console is enabled and logging to a persistent file is disabled.

```
B2(su)->show logging local
Syslog Console Logging enabled
Syslog File Logging disabled
```

set logging local

Use this command to configure log messages to the console and a persistent file.

Syntax

```
set logging local console {enable | disable} file {enable | disable}
```

Parameters

console enable | disable	Enables or disables logging to the console.
file enable | disable	Enables or disables logging to a persistent file.

Defaults

None.

Mode

Switch command, read-write.

Example

This command shows how to enable logging to the console and disable logging to a persistent file:

```
B2(su)->set logging local console enable file disable
```

clear logging local

Use this command to clear the console and persistent store logging for the local session.

Syntax

```
clear logging local
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear local logging:

```
B2(su)->clear logging local
```

show logging buffer

Use this command to display the last 256 messages logged. By default, critical failures and user login and logout timestamps are displayed.

Syntax

```
show logging buffer
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows a portion of the information displayed with the **show logging buffer** command:

```
B2(su)->show logging buffer
<165>Sep  4 07:43:09 10.42.71.13 CLI[5]User:rw logged in from 10.2.1.122 (telnet)
<165>Sep  4 07:43:24 10.42.71.13 CLI[5]User: debug failed login from 10.4.1.100
(telnet)
```

Monitoring Network Events and Status

Purpose

To display switch events and command history, to set the size of the history buffer, and to display and disconnect current user sessions.

Commands

For information about...	Refer to page...
history	15-12
show history	15-13
set history	15-13
ping	15-14
show users	15-14
disconnect	15-15
show netstat	15-15

history

Use this command to display the contents of the command history buffer. The command history buffer includes all the switch commands entered up to a maximum of 100, as specified in the **set history** command (“set history” on page 15-13).

Syntax

`history`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the contents of the command history buffer. It shows there are five commands in the buffer:

```
B2(su)->history
 1 hist
 2 show gvrp
 3 show vlan
 4 show igmp
 5 show ip address
```

show history

Use this command to display the size (in lines) of the history buffer.

Syntax

show history

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the size of the history buffer:

```
B2(su)->show history
 History buffer size: 20
```

set history

Use this command to set the size of the history buffer.

Syntax

set history *size* [**default**]

Parameters

size	Specifies the size of the history buffer in lines. Valid values are **1** to **100**.
default	(Optional) Makes this setting persistent for all future sessions.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the size of the command history buffer to 30 lines:

```
B2(su)->set history 30
```

ping

Use this command to send ICMP echo-request packets to another node on the network from the switch CLI.

Syntax

ping *host*

Parameters

host	Specifies the IP address of the device to which the **ping** will be sent.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example shows how to ping IP address 134.141.89.29. In this case, this host is alive:

```
B2(su)->ping 134.141.89.29
134.141.89.29 is alive
```

In this example, the host at IP address is not responding:

```
B2(su)->ping 134.141.89.255
no answer from 134.141.89.255
```

show users

Use this command to display information about the active console port or Telnet session(s) logged in to the switch.

Syntax

show users

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to use the **show users** command. In this output, there are two Telnet users logged in with Read-Write access privileges from IP addresses 134.141.192.119 and 134.141.192.18:

```
B2(su)->show users
  Session  User  Location
  -------- ----- -------------------------
* telnet   rw    134.141.192.119
  telnet   rw    134.141.192.18
```

disconnect

Use this command to close an active console port or Telnet session from the switch CLI.

Syntax

disconnect {*ip-addr* | **console**}

Parameters

ip-addr	Specifies the IP address of the Telnet session to be disconnected. This address is displayed in the output shown in "show users" on page 12-15.
console	Closes an active console port.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example shows how to close a Telnet session to host 134.141.192.119:

```
B2(su)->disconnect 134.141.192.119
```

This example shows how to close the current console session:

```
B2(su)->disconnect console
```

show netstat

Use this command to display network layer statistics.

Syntax

show netstat

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

The following example shows the output of this command.

```
B2(su)->show netstat
Prot Local Address                 Foreign Address               State
---- ----------------------------  ----------------------------  -----------
TCP  127.0.0.1.2222                0.0.0.0.*                     LISTEN
TCP  0.0.0.0.80                    0.0.0.0.*                     LISTEN
TCP  0.0.0.0.23                    0.0.0.0.*                     LISTEN
TCP  10.1.56.17.23                 134.141.99.104.47718          ESTABLISHED
UDP  0.0.0.0.17185                 0.0.0.0.*
UDP  127.0.0.1.49152               127.0.0.1.17185
UDP  0.0.0.0.161                   0.0.0.0.*
UDP  0.0.0.0.*                     0.0.0.0.*
UDP  0.0.0.0.514                   0.0.0.0.*
```

The following table describes the output of this command.

Table 15-36 show netstat Output Details

Output Field	What it displays...
Prot	Type of protocol running on the connection.
Local Address	IP address of the connection's local host.
Foreign Address	IP address of the connection's foreign host.
State	Communications mode of the connection.

Managing Switch Network Addresses and Routes

Purpose

To display or delete switch ARP table entries, and to display MAC address information.

Commands

For information about...	Refer to page...
show arp	15-17
set arp	15-18
clear arp	15-19
traceroute	15-19
show mac	15-20
show mac agetime	15-21
set mac agetime	15-22
clear mac agetime	15-22
set mac algorithm	15-23
show mac algorithm	15-23
clear mac algorithm	15-24
set mac multicast	15-24
clear mac address	15-25
show mac unreserved-flood	15-26
set mac unreserved-flood	15-26

show arp

Use this command to display the switch's ARP table.

Syntax

```
show arp
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the ARP table:

```
B2(su)->show arp

LINK LEVEL ARP TABLE
IP Address       Phys Address       Flags   Interface
-------------------------------------------------------
10.20.1.1        00-00-5e-00-01-1   S       host
134.142.21.194   00-00-5e-00-01-1   S       host
134.142.191.192  00-00-5e-00-01-1   S       host
134.142.192.18   00-00-5e-00-01-1   S       host
134.142.192.119  00-00-5e-00-01-1   S       host
-------------------------------------------------------
```

Table 15-37 provides an explanation of the command output.

Table 15-37 show arp Output Details

Output Field	What It Displays...
IP Address	IP address mapped to MAC address.
Phys Address	MAC address mapped to IP address.
Flags	Route status. Possible values and their definitions include: **S** - manually configured entry (static) **P** - respond to ARP requests for this entry

set arp

Use this command to add mapping entries to the switch's ARP table.

Syntax

set arp *ip-address mac-address*

Parameters

ip-address	Specifies the IP address to map to the MAC address and add to the ARP table.
mac-address	Specifies the MAC address to map to the IP address and add to the ARP table. The MAC address can be formatted as xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to map IP address 192.168.219.232 to MAC address 00-00-0c-40-0f-bc:

```
B2(su)->set arp 192.168.219.232 00-00-0c-40-0f-bc
```

clear arp

Use this command to delete a specific entry or all entries from the switch's ARP table.

Syntax

clear arp {*ip-address* | **all**}

Parameters

ip-address | **all**	Specifies the IP address in the ARP table to be cleared, or clears all ARP entries.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete entry 10.1.10.10 from the ARP table:

```
B2(su)->clear arp 10.1.10.10
```

traceroute

Use this command to display a hop-by-hop path through an IP network from the device to a specific destination host. Three UDP or ICMP probes will be transmitted for each hop between the source and the traceroute destination.

Syntax

traceroute [**-w** *waittime*] [**-f** *first-ttl*] [**-m** *max-ttl*] [**-p** *port*] [**-q** *nqueries*] [**-r**] [**-d**] [**-n**] [**-v**] *host*

Parameters

-w *waittime*	(Optional) Specifies time in seconds to wait for a response to a probe.
-f *first-ttl*	(Optional) Specifies the time to live (TTL) of the first outgoing probe packet.
-m *max-ttl*	(Optional) Specifies the maximum time to live (TTL) used in outgoing probe packets.
-p *port*	(Optional) Specifies the base UDP port number used in probes.
-q *nqueries*	(Optional) Specifies the number of probe inquiries.
-r	(Optional) Bypasses the normal host routing tables.
-d	(Optional) Sets the debug socket option.
-n	(Optional) Displays hop addresses numerically. (Supported in a future release.)

-v	(Optional) Displays verbose output, including the size and destination of each response.
host	Specifies the host to which the route of an IP packet will be traced.

Defaults

If not specified, *waittime* will be set to **5** seconds.

If not specified, *first-ttl* will be set to **1** second.

If not specified, *max-ttl* will be set to **30** seconds.

If not specified, *port* will be set to **33434**.

If not specified, *nqueries* will be set to **3**.

If **-r** is not specified, normal host routing tables will be used.

If **-d** is not specified, the debug socket option will not be used.

If **-v** is not specified, summary output will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to use traceroute to display a round trip path to host 192.167.252.17. In this case, hop 1 is the SecureStack B2 switch, hop 2 is 14.1.0.45, and hop 3 is back to the host IP address. Round trip times for each of the three UDP probes are displayed next to each hop:

```
B2(su)->traceroute 192.167.252.17
traceroute to 192.167.252.17 (192.167.252.17), 30 hops max, 40 byte packets
  1  matrix.enterasys.com (192.167.201.40)  20.000 ms  20.000 ms  20.000 ms
  2  14.1.0.45 (14.1.0.45)  40.000 ms  10.000 ms  20.000 ms
  3  192.167.252.17 (192.167.252.17)  50.000 ms  0.000 ms  20.000 ms
```

show mac

Use this command to display MAC addresses in the switch's filtering database. These are addresses learned on a port through the switching process.

Syntax

show mac [**address** *mac-address*] [**fid** *fid*] [**port** *port-string*] [**type** {**other** | **learned** | **self** | **mgmt**}]

Parameters

address *mac-address*	(Optional) Displays a specific MAC address (if it is known by the device).
fid *fid*	(Optional) Displays MAC addresses for a specific filter database identifier.
port *port-string*	(Optional) Displays MAC addresses for specific port(s).
type other |**learned** | **self** | **mgmt**	(Optional) Displays information related to **other**, **learned**, **self** or **mgmt** (management) address type.

Defaults

If no parameters are specified, all MAC addresses for the device will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display MAC address information for ge.3.1:

```
B2(su)->show mac port ge.3.1

MAC Address       FID  Port          Type
----------------- ---- ------------- --------
00-09-6B-0F-13-E6 15   ge.3.1        Learned

MAC Address       VLAN Port          Type    Status  Egress Ports
----------------- ---- ------------- ------- ------- --------------------------
01-01-23-34-45-56 20   any           mcast   perm    ge.3.1
```

Table 15-38 provides an explanation of the command output.

Table 15-38 show mac Output Details

Output Field	What It Displays...
MAC Address	MAC addresses mapped to the port(s) shown.
FID	Filter database identifier.
Port	Port designation.
Type	Address type. Valid types are: • Learned • Self • Management • Other (this will include any static MAC locked addresses as described in "Configuring MAC Locking" on page 19-50). • mcast (multicast)
VLAN	The VLAN ID configured for the multicast MAC address.
Status	The status of the multicast address.
Egress Ports	The ports which have been added to the egress ports list.

show mac agetime

Use this command to display the timeout period for aging learned MAC entries.

Syntax

show mac agetime

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the MAC timeout period:

```
B2(su)->show mac agetime
Aging time: 300 seconds
```

set mac agetime

Use This command to set the timeout period for aging learned MAC entries.

Syntax

set mac agetime *time*

Parameters

time	Specifies the timeout period in seconds for aging learned MAC addresses. Valid values are 10 to 1,000,000 seconds. Default value is 300 seconds.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to set the MAC timeout period:

```
B2(su)->set mac agetime 250
```

clear mac agetime

Use this command to reset the timeout period for aging learned MAC entries to the default value of 300 seconds.

Syntax

clear mac agetime

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to reset the MAC timeout period to the default value of 300 seconds.

```
B2(su)->clear mac agetime
```

set mac algorithm

Use this command to set the MAC algorithm mode, which determines the hash mechanism used by the device when performing Layer 2 lookups on received frames.

Syntax

```
set mac algorithm {mac-crc16-lowerbits | mac-crc16-upperbits |
mac-crc32-lowerbits | mac-crc32-upperbits}
```

Parameters

mac-crc16-lowerbits	Select the MAC CRC 16 lower bits algorithm for hashing.
mac-crc16-upperbits	Select the MAC CRC 16 upper bits algorithm for hashing.
mac-crc32-lowerbits	Select the MAC CRC 32 lower bits algorithm for hashing.
mac-crc32-upperbits	Select the MAC CRC 32 upper bits algorithm for hashing.

Defaults

The default MAC algorithm is **mac-crc16-upperbits**.

Mode

Switch command, read-write.

Usage

Each algorithm is optimized for a different spread of MAC addresses. When changing this mode, the switch will display a warning message and prompt you to restart the device.

The default MAC algorithm is mac-crc16-upperbits.

Example

This example sets the hashing algorithm to mac-crc32-upperbits.

```
B2(rw)->set mac algorithm mac-crc32-upperbits
```

show mac algorithm

This command displays the currently selected MAC algorithm mode.

Syntax

```
show mac algorithm
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows the output of this command.

```
B2(su)->show mac algorithm
Mac hashing algorithm is mac-crc16-upperbits.
```

clear mac algorithm

Use this command to return the MAC hashing algorithm to the default value of **mac-crc16-upperbits.**

Syntax

clear mac algorithm

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example resets the MAC hashing algorithm to the default value.

```
B2(su)->clear mac algorithm
```

set mac multicast

Use this command to define on what ports within a VLAN a multicast address can be dynamically learned on, or on what ports a frame with the specified MAC address can be flooded. Also, use this command to append ports to or clear ports from the egress ports list.

Syntax

set mac multicast *mac-address vlan-id* [*port-string*] [{**append** | **clear**} *port-string*]

Parameters

mac-address	Specifies the multicast MAC address. The MAC address can be formatted as xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx.
vlan-id	Specifies the VLAN ID containing the ports.
port-string	Specifies the port or range of ports the multicast MAC address can be learned on or flooded to.
append | **clear**	Appends or clears the port or range of ports from the egress port list.

Defaults

If no *port-string* is defined, the command will apply to all ports.

Mode

Switch command, read-write.

Example

This example configures multicast MAC address 01-01-22-33-44-55 for VLAN 24.

```
B2(su)->set mac multicast 01-01-22-33-44-55 24
```

clear mac address

Use this command to remove a multicast MAC address.

Syntax

clear mac address *mac-address* [*vlan-id*]

Parameters

mac-address	Specifies the multicast MAC address to be cleared. The MAC address can be formatted as xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx.
vlan-id	(Optional) Specifies the VLAN ID from which to clear the static multicast MAC address.

Defaults

If no *vlan-id* is specified, the multicast MAC address is cleared from all VLANs.

Mode

Switch command, read-write.

Example

This example clears multicast MAC address 01-01-22-33-44-55 from VLAN 24.

```
B2(su)->clear mac multicast 01-01-22-33-44-55 24
```

show mac unreserved-flood

Use this command to display the state of multicast flood protection.

Syntax

```
show mac unreserved-flood
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example displays the status of multicast flood protection.

```
B2(su)->show mac unreserved-flood
mac unreserved flood is disabled.
```

set mac unreserved-flood

Use this command to enable or disable multicast flood protection. When enabled, this prevents policy profiles requiring a full 10 masks from being loaded.

Syntax

```
set mac unreserved-flood {disable | enable}
```

Parameters

disable | **enable**	Disables or enables multicast flood protection.

Defaults

None.

Mode

Switch command, read-write.

Usage

The following addresses will be forwarded when this function is enabled:

01:80:C2:00:00:11

01:80:C2:00:00:14

01:80:C2:00:00:15

The default state is disabled, and these addresses will not be forwarded.

Example

This example enables multicast flood protection.

```
B2(su)->set mac unreserved-flood enable
```

Configuring Simple Network Time Protocol (SNTP)

Purpose

To configure the Simple Network Time Protocol (SNTP), which synchronizes device clocks in a network.

Note: A host IP address must be configured on the B2 to support SNTP.

Commands

For information about...	Refer to page...
show sntp	15-27
set sntp client	15-29
clear sntp client	15-29
set sntp server	15-30
clear sntp server	15-30
set sntp poll-interval	15-31
clear sntp poll-interval	15-31
set sntp poll-retry	15-32
clear sntp poll-retry	15-32
set sntp poll-timeout	15-33
clear sntp poll-timeout	15-33
set timezone	15-33

show sntp

Use this command to display SNTP client settings.

Syntax

`show sntp`

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display SNTP client settings:

```
B2(su)->show sntp
SNTP Version: 3
Current Time: TUE SEP 09 16:13:33 2003
Timezone: 'EST', offset from UTC is -4 hours and 0 minutes
Client Mode: unicast
Broadcast Count: 0
Poll Interval: 512 seconds
Poll Retry: 1
Poll Timeout: 5 seconds
SNTP Poll Requests: 1175
Last SNTP Update: TUE SEP 09 16:05:24 2003
Last SNTP Request: TUE SEP 09 16:05:24 2003
Last SNTP Status: Success

SNTP-Server       Precedence       Status
----------------------------------------
10.2.8.6              2            Active
144.111.29.19         1            Active
```

Table 15-39 provides an explanation of the command output.

Table 15-39 show sntp Output Details

Output Field	What It Displays...
SNTP Version	SNTP version number.
Current Time	Current time on the system clock.
Timezone	Time zone name and amount it is offset from UTC (Universal Time). Set using the **set timezone** command (“set timezone” on page 15-33).
Client Mode	Whether SNTP client is operating in unicast or broadcast mode. Set using **set sntp client** command (“set sntp client” on page 15-29).
Broadcast Count	Number of SNTP broadcast frames received.
Poll Interval	Interval between SNTP unicast requests. Default of 512 seconds can be reset using the **set sntp poll-interval** command (“set sntp poll-interval” on page 15-31).
Poll Retry	Number of poll retries to a unicast SNTP server. Default of 1 can be reset using the **set sntp poll-retry** command (“set sntp poll-retry” on page 15-32).
Poll Timeout	Timeout for a response to a unicast SNTP request. Default of 5 seconds can be reset using **set sntp poll-timeout** command (“set sntp poll-timeout” on page 15-33).
SNTP Poll Requests	Total number of SNTP poll requests.
Last SNTP Update	Date and time of most recent SNTP update.
Last SNTP Request	Date and time of most recent SNTP request.

Table 15-39 show sntp Output Details (Continued)

Output Field	What It Displays...
Last SNTP Status	Whether or not broadcast reception or unicast transmission and reception was successful.
SNTP-Server	IP address(es) of SNTP server(s).
Precedence	Precedence level of SNTP server in relation to its peers. Highest precedence is 1 and lowest is 10. Default of 1 can be reset using the **set sntp server** command ("set sntp server" on page 15-30).
Status	Whether or not the SNTP server is active.

set sntp client

Use this command to set the SNTP operation mode.

Syntax

```
set sntp client {broadcast | unicast | disable}
```

Parameters

broadcast	Enables SNTP in broadcast client mode.
unicast	Enables SNTP in unicast (point-to-point) client mode. In this mode, the client must supply the IP address from which to retrieve the current time.
disable	Disables SNTP.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable SNTP in broadcast mode:

```
B2(su)->set sntp client broadcast
```

clear sntp client

Use this command to clear the SNTP client's operational mode.

Syntax

```
clear sntp client
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the SNTP client's operational mode:

```
B2(su)->clear sntp client
```

set sntp server

Use this command to add a server from which the SNTP client will retrieve the current time when operating in unicast mode. Up to 10 servers can be set as SNTP servers.

Syntax

set sntp server *ip-address* [*precedence*]

Parameters

ip-address	Specifies the SNTP server's IP address.
precedence	(Optional) Specifies this SNTP server's precedence in relation to its peers. Valid values are **1** (highest) to **10** (lowest).

Defaults

If *precedence* is not specified, 1 will be applied.

Mode

Switch command, read-write.

Example

This example shows how to set the server at IP address 10.21.1.100 as an SNTP server:

```
B2(su)->set sntp server 10.21.1.100
```

clear sntp server

Use this command to remove one or all servers from the SNTP server list.

Syntax

clear sntp server {*ip-address* | **all**}

Parameters

ip-address	Specifies the IP address of a server to remove from the SNTP server list.
all	Removes all servers from the SNTP server list.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to remove the server at IP address 10.21.1.100 from the SNTP server list:

```
B2(su)->clear sntp server 10.21.1.100
```

set sntp poll-interval

Use this command to set the poll interval between SNTP unicast requests.

Syntax

set sntp poll-interval *interval*

Parameters

interval	Specifies the poll interval in seconds. Valid values are **16** to **16284**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the SNTP poll interval to 30 seconds:

```
B2(su)->set sntp poll-interval 30
```

clear sntp poll-interval

Use this command to clear the poll interval between unicast SNTP requests.

Syntax

clear sntp poll-interval

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the SNTP poll interval:

```
B2(su)->clear sntp poll-interval
```

set sntp poll-retry

Use this command to set the number of poll retries to a unicast SNTP server.

Syntax

set sntp poll-retry *retry*

Parameters

retry	Specifies the number of retries. Valid values are **0** to **10.**

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the number of SNTP poll retries to 5:

```
B2(su)->set sntp poll-retry 5
```

clear sntp poll-retry

Use this command to clear the number of poll retries to a unicast SNTP server.

Syntax

clear sntp poll-retry

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the number of SNTP poll retries:

```
B2(su)->clear sntp poll-retry
```

set sntp poll-timeout

Use this command to set the poll timeout (in seconds) for a response to a unicast SNTP request.

Syntax

set sntp poll-timeout *timeout*

Parameters

timeout	Specifies the poll timeout in seconds. Valid values are **1** to **30**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the SNTP poll timeout to 10 seconds:

```
B2(su)->set sntp poll-timeout 10
```

clear sntp poll-timeout

Use this command to clear the SNTP poll timeout.

Syntax

clear sntp poll-timeout

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the SNTP poll timeout:

```
B2(su)->clear sntp poll-timeout
```

set timezone

Use this command to configure the current timezone as an offset from UTC.

Syntax

set timezone *name* [*hours*] [*minutes*]

Parameters

name	The name of the timezone. Typically, this name is a standard abbreviation such as EST (Eastern Standard Time) or EDT (Eastern Daylight Time).
hours	(Optional) Specifies the offset in hours from UTC. The value can range from -13 to 13. The default is 0 hours.
minutes	(Optional) Specifies additional offset in minutes from UTC. The value can range from 0 to 59. The default is 0 minutes.

Defaults

If you enter a timezone name without specifying an offset in hours and minutes, the default is an offset from UTC of 0 hours and 0 minutes.

Mode

Switch command, read-write.

Usage

Typically, this command is used to configure the local timezone offset from UTC (Univeral Time) when SNTP is used to synchronize the time used by devices on the network.

To display the current timezone setting used by SNTP, use the **show sntp** command. To clear an existing offset to zero, enter the command without specifying any hours or minutes.

Standard timezone names and offsets can be found at the following URL, among others:

http://www.timeanddate.com/library/abbreviations/timezones/

Example

The following example sets the timezone name to EST and the offset to North American Eastern Standard Time offset of -5 hours from UTC, then displays the timezone used with SNTP.

```
B2(su)->set timezone EST -5

B2(su)->show sntp
SNTP Version: 3
Current Time: WED JUL 16 11:35:52 2008
Timezone: 'EST' offset from UTC is -5 hours and 0 minutes
Client Mode: unicast
Broadcast Count: 0
Poll Interval: 6 (64 seconds)
Poll Retry: 1
Poll Timeout: 5 seconds
SNTP Poll Requests: 2681
Last SNTP Update: WED JUL 16 16:35:23 2008
Last SNTP Request: WED JUL 16 16:35:23 2008
Last SNTP Status: Success

SNTP-Server       Precedence       Status
-----------------------------------------
192.255.255.254        2            Active
```

Configuring Node Aliases

The node alias feature enables administrators to determine the MAC address and location of a given end-station (or node) using the node's Layer 3 alias information (IP address) as a key. With this method, it is possible to determine that, for instance, IP address 123.145.2.23 is located on switch 5 port 3.

The passive accumulation of a network's node/alias information is accomplished by "snooping" on the contents of network traffic as it passes through the switch fabric.

In the B2, node data is automatically accumulated into the ct-alias mib, and by default this feature is enabled. The NetSight Console Compass utility and Automated Security Manager (ASM) use the information in the node/alias MIB table.

It's important to make sure that inter-switch links are not learning node/alias information, as it would slow down searches by the NetSight Compass and ASM tools and give inaccurate results.

Purpose

To review, disable, and re-enable node (port) alias functionality on the switch.

Commands

For information about...	Refer to page...
show nodealias config	15-35
set nodealias	15-36
clear nodealias config	15-37

show nodealias config

Use this command to display node alias configuration settings on one or more ports.

Syntax

show nodealias config [*port-string*]

Parameters

port-string	(Optional) Displays node alias configuration settings for specific port(s).

Defaults

If *port-string* is not specified, node alias configurations will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display node alias configuration settings for ports fe.2.1 through 9:

```
B2(rw)->show nodealias config fe.2.1-9
Port Number        Max Entries         Used Entries        Status
```

```
-----------         -----------         ------------        ------
fe.2.1              16                  0                   Enable
fe.2.2              47                  0                   Enable
fe.2.3              47                  2                   Enable
fe.2.4              47                  0                   Enable
fe.2.5              47                  0                   Enable
fe.2.6              47                  2                   Enable
fe.2.7              47                  0                   Enable
fe.2.8              47                  0                   Enable
fe.2.9              4000                1                   Enable
```

Table 15-40 provides an explanation of the command output.

Table 15-40 show nodealias config Output Details

Output Field	What It Displays...
Port Number	Port designation.
Max Entries	Maximum number of alias entries configured for this port.
Used Entries	Number of alias entries (out of the maximum amount configured) already used by this port.
Status	Whether or not a node alias agent is enabled (default) or disabled on this port.

set nodealias

Use this command to enable or disable a node alias agent on one or more ports, or set the maximum number of alias entries stored per port.

Syntax

set nodealias {**enable** | **disable** | **maxentries** *maxentries*} *port-string*

Parameters

enable | **disable**	Enables or disables a node alias agent.
maxentries *maxentries*	Set the maximum number of alias entries stored per port. Valid range is 0 to 4096. The default value is 32.
port-string	Specifies the port(s) on which to enable/disable node alias agent or set a maximum number of stored entries.

Defaults

None.

Mode

Switch command, read-write.

Usage

Upon packet reception, node aliases are dynamically assigned to ports enabled with an alias agent, which is the default setting on SecureStack B2 devices. Node aliases cannot be statically created, but can be deleted using the command “clear nodealias config” (page 15-37).

It's important to make sure that inter-switch links are not learning node/alias information, as it would slow down searches by the NetSight Compass and ASM tools and give inaccurate results.

Example

This example shows how to disable the node alias agent on fe.1.3:

```
B2(su)->set nodealias disable fe.1.3
```

clear nodealias config

Use this command to reset node alias state to enabled and clear the maximum entries value.

Syntax

clear nodealias config *port-string*

Parameters

port-string	Specifies the port(s) on which to reset the node alias configuration.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the node alias configuration on fe.1.3:

```
B2(su)->clear nodealias config fe.1.3
```

16

RMON Configuration

This chapter describes the commands used to configure RMON on a SecureStack B2 switch.

For information about...	Refer to page...
RMON Monitoring Group Functions	16-1
Design Considerations	16-2
Statistics Group Commands	16-3
History Group Commands	16-6
Alarm Group Commands	16-9
Event Group Commands	16-13
Filter Group Commands	16-17
Packet Capture Commands	16-22

RMON Monitoring Group Functions

RMON (Remote Network Monitoring) provides comprehensive network fault diagnosis, planning, and performance tuning information and allows for interoperability between SNMP management stations and monitoring agents. RMON extends the SNMP MIB capability by defining additional MIBs that generate a much richer set of data about network usage. These MIB "groups" each gather specific sets of data to meet common network monitoring requirements.

Table 16-41 lists the RMON monitoring groups supported on SecureStack B2 devices, each group's function and the elements it monitors, and the associated configuration commands needed.

Table 16-41 RMON Monitoring Group Functions and Commands

RMON Group	What It Does...	What It Monitors...	CLI Command(s)
Statistics	Records statistics measured by the RMON probe for each monitored interface on the device.	Packets dropped, packets sent, bytes sent (octets), broadcast and multicast packets, CRC errors, oversized and undersized packets, fragments, jabbers, and counters for packets.	"show rmon stats" on page 16-4 "set rmon stats" on page 16-4 "clear rmon stats" on page 16-5

Table 16-41 RMON Monitoring Group Functions and Commands (Continued)

RMON Group	What It Does...	What It Monitors...	CLI Command(s)
History	Records periodic statistical samples from a network.	Sample period, number of samples and item(s) sampled.	"show rmon history" on page 16-6 "set rmon history" on page 16-7 "clear rmon history" on page 16-7
Alarm	Periodically gathers statistical samples from variables in the probe and compares them with previously configured thresholds. If the monitored variable crosses a threshold, an event is generated.	Alarm type, interval, starting threshold, stop threshold.	"show rmon alarm" on page 16-9 "set rmon alarm properties" on page 16-10 "set rmon alarm status" on page 16-11 "clear rmon alarm" on page 16-12
Event	Controls the generation and notification of events from the device.	Event type, description, last time event was sent.	"show rmon event" on page 16-13 "set rmon event properties" on page 16-14 "set rmon event status" on page 16-15 "clear rmon event" on page 16-15
Filter	Allows packets to be matched by a filter equation. These matched packets form a data stream or "channel" that may be captured.	Packets matching the filter configuration.	"show rmon channel" on page 16-17 "set rmon channel" on page 16-18 "clear rmon channel" on page 16-19 "show rmon filter" on page 16-19 "set rmon filter" on page 16-20 "clear rmon filter" on page 16-21
Packet Capture	Allows packets to be captured upon a filter match.	Packets matching the filter configuration.	"show rmon capture" on page 16-22 "set rmon capture" on page 16-23 "clear rmon capture" on page 16-24

Design Considerations

The B2 supports RMON Packet Capture/Filter Sampling through both the CLI and MIBs, but with the following constraints:

- RMON Packet Capture/Filter Sampling and Port Mirroring cannot be enabled on the same interface concurrently.
- You can capture a total of 100 packets on an interface, no more and no less.
  - The captured frames will be as close to sequential as the hardware will allow.
  - Only one interface can be configured for capturing at a time.
  - Once 100 frames have been captured by the hardware, the application will stop without manual intervention.
- As described in the MIB, the filter is only applied after the frame is captured, thus only a subset of the frames captured will be available for display.
- There is only one Buffer Control Entry supported.
- Due to the limitations of the hardware, the Buffer Control Entry table will have limits on a few of its elements:
  - MaxOctetsRequested can only be set to the value -1 which indicates the application will capture as many packets as possible given its restrictions.
  - CaptureSliceSize can only be set to 1518.
  - The Full Action element can only be set to “lock” since the device does not support wrapping the capture buffer.
- Due to hardware limitations, the only frame error counted is oversized frames.
- The application does not support Events. Therefore, the following elements of the Channel Entry Table are not supported: TurnOnEventIndex, TurnOffEventIndex, EventIndex, and EventStatus.
- There is only one Channel Entry available at a time.
  - There are only three Filter Entries available, and a user can associate all three Filter Entries with the Channel Entry.
- Configured channel, filter, and buffer information will be saved across resets, but not frames within the capture buffer.

Statistics Group Commands

Purpose

To display, configure, and clear RMON statistics.

Note: Due to hardware limitations, the only frame error counted is oversized frames.

Commands

For information about...	Refer to page...
show rmon stats	16-4
set rmon stats	16-4
clear rmon stats	16-5

show rmon stats

Use this command to display RMON statistics measured for one or more ports.

Syntax

show rmon stats [*port-string*]

Parameters

port-string	(Optional) Displays RMON statistics for specific port(s).

Defaults

If *port-string* is not specified, RMON stats will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display RMON statistics for Gigabit Ethernet port 1 in switch 1.

```
B2(su)->show rmon stats fe.1.1

Port: fe.1.1
-------------------------------------
Index           = 1
Owner           = monitor
Data Source     = ifIndex.1

Drop Events     = 0       Packets             = 0
Collisions      = 0       Octets              = 0
Jabbers         = 0       0    -   64 Octets  = 0
Broadcast Pkts  = 0       65   -  127 Octets  = 0
Multicast Pkts  = 0       128  -  255 Octets  = 0
CRC Errors      = 0       256  -  511 Octets  = 0
Undersize Pkts  = 0       512  - 1023 Octets  = 0
Oversize Pkts   = 0       1024 - 1518 Octets  = 0
Fragments       = 0
```

Table 16-42 provides an explanation of the command output.

set rmon stats

Use this command to configure an RMON statistics entry.

Syntax

set rmon stats *index port-string* [*owner*]

Parameters

index	Specifies an index for this statistics entry.
port-string	Specifies port(s) to which this entry will be assigned.
owner	(Optional) Assigns an owner for this entry.

Defaults

If *owner* is not specified, **monitor** will be applied.

Mode

Switch command, read-write.

Example

This example shows how to configure RMON statistics entry 2 for fe.1.20:

```
B2(rw)->set rmon stats 2 fe.1.20
```

clear rmon stats

Use this command to delete one or more RMON statistics entries.

Syntax

clear rmon stats {*index-list* | **to-defaults**}

Parameters

index-list	Specifies one or more stats entries to be deleted, causing them to disappear from any future RMON queries.
to-defaults	Resets all history entries to default values. This will cause entries to reappear in RMON queries.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete RMON statistics entry 2:

```
B2(rw)->clear rmon stats 2
```

History Group Commands

Purpose

To display, configure, and clear RMON history properties and statistics.

Commands

For information about...	Refer to page...
show rmon history	16-6
set rmon history	16-7
clear rmon history	16-7

show rmon history

Use this command to display RMON history properties and statistics. The RMON history group records periodic statistical samples from a network.

Syntax

show rmon history [*port-string*]

Parameters

port-string	(Optional) Displays RMON history entries for specific port(s).

Defaults

If *port-string* is not specified, information about all RMON history entries will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display RMON history entries for Gigabit Ethernet port 1 in switch 1. A control entry displays first, followed by actual entries corresponding to the control entry. In this case, the default settings for entry owner, sampling interval, and maximum number of entries. (buckets) have not been changed from their default values. For a description of the types of statistics shown, refer to Table 16-42.

```
B2(su)->show rmon history fe.1.1

Port: fe.1.1
-------------------------------------
Index 1
Owner             = monitor
Status            = valid
Data Source       = ifIndex.1
Interval          = 30
Buckets Requested = 50
Buckets Granted   = 10
```

```
Sample  2779         Interval Start: 1 days 0 hours 2 minutes 22 seconds
Drop Events       = 0       Undersize Pkts    = 0
Octets            = 0       Oversize Pkts     = 0
Packets           = 0       Fragments         = 0
Broadcast Pkts    = 0       Jabbers           = 0
Multicast Pkts    = 0       Collisions        = 0
CRC Align Errors  = 0       Utilization(%)    = 0
```

set rmon history

Use this command to configure an RMON history entry.

Syntax

set rmon history *index* [*port-string*] [**buckets** *buckets*] [**interval** *interval*] [**owner** *owner*]

Parameters

index-list	Specifies an index number for this entry.
port-string	(Optional) Assigns this entry to a specific port.
buckets *buckets*	(Optional) Specifies the maximum number of entries to maintain.
interval *interval*	(Optional) Specifies the sampling interval in seconds.
owner *owner*	(Optional) Specifies an owner for this entry.

Defaults

If *buckets* is not specified, the maximum number of entries maintained will be 50.

If not specified, *interval* will be set to 30 seconds.

If *owner* is not specified, **monitor** will be applied.

Mode

Switch command, read-write.

Example

This example shows how configure RMON history entry 1 on port fe.2.1 to sample every 20 seconds:

```
B2(rw)->set rmon history 1 fe.2.1 interval 20
```

clear rmon history

Use this command to delete one or more RMON history entries or reset one or more entries to default values. For specific values, refer to “set rmon history” on page 16-7.

Syntax

clear rmon history {*index-list* | **to-defaults**}

Parameters

index-list	Specifies one or more history entries to be deleted, causing them to disappear from any future RMON queries.
to-defaults	Resets all history entries to default values. This will cause entries to reappear in RMON queries.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to delete RMON history entry 1:

```
B2(rw)->clear rmon history 1
```

Alarm Group Commands

Purpose

To display, configure, and clear RMON alarm entries and properties.

Commands

For information about...	Refer to page...
show rmon alarm	16-9
set rmon alarm properties	16-10
set rmon alarm status	16-11
clear rmon alarm	16-12

show rmon alarm

Use this command to display RMON alarm entries. The RMON alarm group periodically takes statistical samples from RMON variables and compares them with previously configured thresholds. If the monitored variable crosses a threshold an RMON event is generated.

Syntax

show rmon alarm [*index*]

Parameters

index	(Optional) Displays RMON alarm entries for a specific entry index ID.

Defaults

If *index* is not specified, information about all RMON alarm entries will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display RMON alarm entry 3:

```
B2(rw)->show rmon alarm 3

Index 3
---------------------
Owner               = Manager
Status              = valid
Variable            = 1.3.6.1.4.1.5624.1.2.29.1.2.1.0
Sample Type         = delta          Startup Alarm       = rising
Interval            = 30             Value               = 0
Rising Threshold    = 1              Falling Threshold   = 0
Rising Event Index  = 2              Falling Event Index = 0
```

Table 16-42 provides an explanation of the command output.

Table 16-42 show rmon alarm Output Details

Output Field	What It Displays...
Index	Index number for this alarm entry.
Owner	Text string identifying who configured this entry.
Status	Whether this event entry is enabled (valid) or disabled.
Variable	MIB object to be monitored.
Sample Type	Whether the monitoring method is an absolute or a delta sampling.
Startup Alarm	Whether alarm generated when this entry is first enabled is rising, falling, or either.
Interval	Interval in seconds at which RMON will conduct sample monitoring.
Rising Threshold	Minimum threshold for causing a rising alarm.
Falling Threshold	Maximum threshold for causing a falling alarm.
Rising Event Index	Index number of the RMON event to be triggered when the rising threshold is crossed.
Falling Event Index	Index number of the RMON event to be triggered when the falling threshold is crossed.

set rmon alarm properties

Use this command to configure an RMON alarm entry, or to create a new alarm entry with an unused alarm index number.

Syntax

```
set rmon alarm properties index [interval interval] [object object] [type
{absolute | delta}] [startup {rising | falling | either}] [rthresh rthresh]
[fthresh fthresh] [revent revent] [fevent fevent] [owner owner]
```

Parameters

index	Specifies an index number for this entry. Maximum number or entries is 50**.** Maximum value is **65535.**
interval *interval*	(Optional) Specifies an interval (in seconds) for RMON to conduct sample monitoring.
object *object*	(Optional) Specifies a MIB object to be monitored. **Note:** This parameter is not mandatory for executing the command, but must be specified in order to enable the alarm entry configuration.
type absolute | **delta**	(Optional) Specifies the monitoring method as: sampling the absolute value of the object, or the difference (delta) between object samples.

startup rising | **falling** | **either**	(Optional) Specifies the type of alarm generated when this event is first enabled as: • Rising - Sends alarm when an RMON event reaches a maximum threshold condition is reached, for example, more than 30 collisions per second. • Falling - Sends alarm when RMON event falls below a minimum threshold condition, for example when the network is behaving normally again. • Either - Sends alarm when either a rising or falling threshold is reached.
rthresh *rthresh*	(Optional) Specifies a minimum threshold for causing a rising alarm.
fthresh *fthresh*	Specifies a maximum threshold for causing a falling alarm.
revent *revent*	Specifies the index number of the RMON event to be triggered when the rising threshold is crossed.
fevent *fevent*	Specifies the index number of the RMON event to be triggered when the falling threshold is crossed.
owner *owner*	(Optional) Specifies the name of the entity that configured this alarm entry.

Defaults

interval - **3600** seconds

type - **absolute**

startup - **rising**

rthresh - **0**

fthresh - **0**

revent - **0**

fevent - **0**

owner - **monitor**

Mode

Switch command, read-write.

Example

This example shows how to configure a rising RMON alarm. This entry will conduct monitoring of the delta between samples every 30 seconds:

```
B2(rw)->set rmon alarm properties 3 interval 30 object
   1.3.6.1.4.1.5624.1.2.29.1.2.1.0 type delta rthresh 1 revent 2 owner Manager
```

set rmon alarm status

Use this command to enable an RMON alarm entry. An alarm is a notification that a statistical sample of a monitored variable has crossed a configured threshold.

Syntax

set rmon alarm status *index* **enable**

Parameters

index	Specifies an index number for this entry. Maximum number or entries is 50**.** Maximum value is **65535.**
enable	Enables this alarm entry.

Defaults

None.

Mode

Switch command, read-write.

Usage

An RMON alarm entry can be created using this command, configured using the **set rmon alarm properties** command ("set rmon alarm properties" on page 16-10), then enabled using this command. An RMON alarm entry can be created and configured at the same time by specifying an unused index with the **set rmon alarm properties** command.

Example

This example shows how to enable RMON alarm entry 3:

```
B2(rw)->set rmon alarm status 3 enable
```

clear rmon alarm

Use this command to delete an RMON alarm entry.

Syntax

clear rmon alarm *index*

Parameters

index	Specifies the index number of entry to be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear RMON alarm entry 1:

```
B2(rw)->clear rmon alarm 1
```

Event Group Commands

Purpose

To display and clear RMON events, and to configure RMON event properties.

Commands

For information about...	Refer to page...
show rmon event	16-13
set rmon event properties	16-14
set rmon event status	16-15
clear rmon event	16-15

show rmon event

Use this command to display RMON event entry properties.

Syntax

show rmon event [*index*]

Parameters

index	(Optional) Displays RMON properties and log entries for a specific entry index ID.

Defaults

If *index* is not specified, information about all RMON entries will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display RMON event entry 3:

```
B2(rw)->show rmon event 3

Index 3
----------------
Owner          = Manager
Status         = valid
Description    = STP Topology change
Type           = log-and-trap
Community      = public
Last Time Sent = 0 days 0 hours 0 minutes 37 seconds
```

Table 16-43 provides an explanation of the command output.

Table 16-43 show rmon event Output Details

Output Field	What It Displays...
Index	Index number for this event entry.
Owner	Text string identifying who configured this entry.
Status	Whether this event entry is enabled (valid) or disabled.
Description	Text string description of this event.
Type	Whether the event notification will be a log entry, and SNMP trap, both, or none.
Community	SNMP community name if message type is set to trap.
Last Time Sent	When an event notification matching this entry was sent.

set rmon event properties

Use this command to configure an RMON event entry, or to create a new event entry with an unused event index number.

Syntax

set rmon event properties *index* [**description** *description*] [**type {none** | **log** | **trap** | **both}**] [**community** *community*] [**owner** *owner*]

Parameters

index	Specifies an index number for this entry. Maximum number of entries is 100. Maximum value is **65535**.
description *description*	(Optional) Specifies a text string description of this event.
type none | **log** | **trap** | **both**	(Optional) Specifies the type of RMON event notification as: none, a log table entry, an SNMP trap, or both a log entry and a trap message.
community *community*	(Optional) Specifies an SNMP community name to use if the message type is set to **trap**. For details on setting SNMP traps and community names, refer to "Creating a Basic SNMP Trap Configuration" on page 8-37.
owner *owner*	(Optional) Specifies the name of the entity that configured this entry.

Defaults

If **description** is not specified, none will be applied.

If not specified, **type none** will be applied.

If *owner* is not specified, **monitor** will be applied.

Mode

Switch command, read-write.

Example

This example shows how to create and enable an RMON event entry called "STP topology change" that will send both a log entry and an SNMP trap message to the "public" community:

```
B2(rw)->set rmon event properties 2 description "STP topology change" type both
community public owner Manager
```

set rmon event status

Use this command to enable an RMON event entry. An event entry describes the parameters of an RMON event that can be triggered. Events can be fired by RMON alarms and can be configured to create a log entry, generate a trap, or both.

Syntax

set rmon event status *index* **enable**

Parameters

index	Specifies an index number for this entry. Maximum number of entries is 100. Maximum value is **65535**.
enable	Enables this event entry.

Defaults

None.

Mode

Switch command, read-write.

Usage

An RMON event entry can be created using this command, configured using the **set rmon event properties** command ("set rmon event properties" on page 16-14), then enabled using this command. An RMON event entry can be created and configured at the same time by specifying an unused index with the **set rmon event properties** command.

Example

This example shows how to enable RMON event entry 1:

```
B2(rw)->set rmon event status 1 enable
```

clear rmon event

Use this command to delete an RMON event entry and any associated log entries.

Syntax

clear rmon event *index*

Parameters

index	Specifies the index number of the entry to be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear RMON event 1:

```
B2(rw)->clear rmon event 1
```

Filter Group Commands

The packet capture and filter function is disabled by default. Only one interface can be configured for capturing and filtering at a time.

When packet capture is enabled on an interface, the SecureStack B2 switch will capture 100 frames as close to sequentially as possible. These 100 frames will be placed into a buffer for inspection. If there is data in the buffer when the function is started, the buffer will be overwritten. Once 100 frames have been captured, the capture will stop. Filtering will be performed on the frames captured in the buffer. Therefore, only a subset of the frames captured will be available for display.

Note: Packet capture is sampling only and does not guarantee receipt of back to back packets.

One channel at a time can be supported, with up to three filters. Configured channel, filter, and buffer control information will be saved across resets, but captured frames within the buffer will not be saved.

This function cannot be used concurrently with port mirroring. The system will check to prevent concurrently enabling both functions, and a warning will be generated in the CLI if attempted.

Commands

For information about...	Refer to page...
show rmon channel	16-17
set rmon channel	16-18
clear rmon channel	16-19
show rmon filter	16-19
set rmon filter	16-20
clear rmon filter	16-21

show rmon channel

Use this command to display RMON channel entries for one or more ports.

Syntax

`show rmon channel` [*`port-string`*]

Parameters

port-string	(Optional) Displays RMON channel entries for a specific port(s).

Defaults

If *port-string* is not specified, information about all channels will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display RMON channel information for fe.2.12:

```
B2(rw)->show rmon channel fe.2.12
Port fe.2.12    Channel index= 628      EntryStatus= valid
-------------------------------------------------------
Control             off       AcceptType          matched
OnEventIndex        0         OffEventIndex       0
EventIndex          0         Status              ready
Matches             4498
Description         Thu Dec 16 12:57:32 EST 2004
Owner               NetSight smith
```

set rmon channel

Use this command to configure an RMON channel entry.

Syntax

set rmon channel *index port-string* [**accept** {**matched** | **failed**}] [**control** {**on** | **off**}] [**description** *description*] [**owner** *owner*]

Parameters

index	Specifies an index number for this entry. An entry will automatically be created if an unused index number is chosen. Maximum number of entries is 2. Maximum value is **65535**.
port-string	Specifies the port on which traffic will be monitored.
accept matched | **failed**	(Optional) Specifies the action of the filters on this channel as: • **matched** - Packets will be accepted on filter matches • **failed** - Packets will be accepted if they fail a match
control on | **off**	(Optional) Enables or disables control of the flow of data through the channel.
description *description*	(Optional) Specifies a description for this channel.
owner *owner*	(Optional) Specifies the name of the entity that configured this entry.

Defaults

If an action is not specified, packets will be accepted on filter matches.

If not specified, **control** will be set to **off**.

If a **description** is not specified, none will be applied.

If *owner* is not specified, it will be set to **monitor.**

Mode

Switch command, read-write.

Example

This example shows how to create an RMON channel entry:

```
B2(rw)->set rmon channel 54313 fe.2.12 accept failed control on description
"capture all"
```

clear rmon channel

Use this command to clear an RMON channel entry.

Syntax

clear rmon channel *index*

Parameters

index	Specifies the channel entry to be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear RMON channel entry 2:

```
B2(rw)->clear rmon channel 2
```

show rmon filter

Use this command to display one or more RMON filter entries.

Syntax

show rmon filter [**index** *index* | **channel** *channel*]

Parameters

index *index* | **channel** *channel*	(Optional) Displays information about a specific filter entry, or about all filters which belong to a specific channel.

Defaults

If no options are specified, information for all filter entries will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display all RMON filter entries and channel information:

```
B2(rw)->show rmon filter

Index= 55508    Channel Index= 628      EntryStatus= valid
------------------------------------------------------------
Data Offset         0         PktStatus           0
PktStatusMask       0         PktStatusNotMask    0
Owner               ETS,NAC-D
----------------------------
Data
ff ff ff ff ff ff
----------------------------
DataMask
ff ff ff ff ff ff
----------------------------
DataNotMask
00 00 00 00 00 00
```

set rmon filter

Use this command to configure an RMON filter entry.

Syntax

set rmon filter *index channel-index* [**offset** *offset*] [**status** *status*] [**smask** *smask*] [**snotmask** *snotmask*] [**data** *data*] [**dmask** *dmask*] [**dnotmask** *dnotmask*] [**owner** *owner*]

Parameters

index	Specifies an index number for this entry. An entry will automatically be created if an unused index number is chosen. Maximum number of entries is 10. Maximum value is **65535**.
channel-index	Specifies the channel to which this filter will be applied.
offset *offset*	(Optional) Specifies an offset from the beginning of the packet to look for matches.
status *status*	(Optional) Specifies packet status bits that are to be matched.
smask *smask*	(Optional) Specifies the mask applied to status to indicate which bits are significant.
snotmask *snotmask*	(Optional) Specifies the inversion mask that indicates which bits should be set or not set
data *data*	(Optional) Specifies the data to be matched.
dmask *dmask*	(Optional) Specifies the mask applied to data to indicate which bits are significant.
dnotmask *dnotmask*	(Optional) Specifies the inversion mask that indicates which bits should be set or not set.
owner	(Optional) Specifies the name of the entity that configured this entry.

Defaults

If *owner* is not specified, it will be set to **monitor.**

If no other options are specified, none (0) will be applied.

Mode

Switch command, read-write.

Example

This example shows how to create RMON filter 1 and apply it to channel 9:

```
B2(rw)->set rmon filter 1 9 offset 30 data 0a154305 dmask ffffffff
```

clear rmon filter

Use this command to clear an RMON filter entry.

Syntax

clear rmon filter {**index** *index* | **channel** *channel*}

Parameters

index *index* | **channel** *channel*	Clears a specific filter entry, or all entries belonging to a specific channel.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear RMON filter entry 1:

```
B2(rw)->clear rmon filter index 1
```

Packet Capture Commands

Note that packet capture filter is sampling only and does not guarantee receipt of back-to-back packets.

Purpose

To display RMON capture entries, configure, enable, or disable capture entries, and clear capture entries.

Commands

For information about...	Refer to page...
show rmon capture	16-22
set rmon capture	16-23
clear rmon capture	16-24

show rmon capture

Use this command to display RMON capture entries and associated buffer control entries.

Syntax

show rmon capture [*index* [**nodata**]]

Parameters

index	(Optional) Displays the specified buffer control entry and all captured packets associated with that entry.
nodata	(Optional) Displays only the buffer control entry specified by index.

Defaults

If no options are specified, all buffer control entries and associated captured packets will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display RMON capture entries and associated buffer entries:

```
B2(rw)->show rmon capture

Buf.control= 28062  Channel= 38283      EntryStatus= valid
------------------------------------------------------------
FullStatus          avail     FullAction          lock
Captured packets    251       Capture slice       1518
Download size       100       Download offset     0
Max Octet Requested 50000     Max Octet Granted   50000
Start time          1 days 0 hours 51 minutes 15 seconds
```

```
Owner               monitor


captureEntry= 1        Buff.control= 28062
-----------------------------------------
Pkt ID      9          Pkt time    1 days 0 hours 51 minutes 15 seconds
Pkt Length  93         Pkt status  0
Data:
00 00 5e 00 01 01 00 01 f4 00 7d ce 08 00 45 00
00 4b b4 b9 00 00 40 11 32 5c 0a 15 43 05 86 8d
bf e5 00 a1 0e 2b 00 37 cf ca 30 2d 02 01 00 04
06 70 75 62 6c 69 63 a2 20 02 02 0c 92 02 01 00
02 01 00 30 14 30 12 06 0d 2b 06 01 02 01 10 07
01 01 0b 81 fd 1c 02 01 01 00 11 0b 00
```

set rmon capture

Use this command to configure an RMON capture entry.

Syntax

set rmon capture *index* {*channel* [**action** {**lock**}] [**slice** *slice*] [**loadsize** *loadsize*] [**offset** *offset*] [**asksize** *asksize*] [**owner** *owner*]}

Parameters

index	Specifies a buffer control entry.
channel	Specifies the channel to which this capture entry will be applied.
action lock	(Optional) Specifies the action of the buffer when it is full as: • **lock** - Packets will cease to be accepted
slice *slice*	(Optional) Specifies the maximum octets from each packet to be saved in a buffer. Currently, the only value allowed is 1518.
loadsize *loadsize*	(Optional) Specifies the maximum octets from each packet to be downloaded from the buffer. The default is 100.
offset *offset*	(Optional) Specifies the first octet from each packet that will be retrieved.
asksize *asksize*	(Optional) Specifies the requested maximum octets to be saved in this buffer. Currently, the only value accepted is -1, which requests as many octets as possible.
owner	(Optional) Specifies the name of the entity that configured this entry.

Defaults

If not specified, **action** defaults to **lock**.

If not specified, **offset** defaults to **0**.

If not specified, **asksize** defaults to -**1** (which will request as many octets as possible).

If **slice** is not specified, **1518** will be applied.

If **loadsize** is not specified, **100** will be applied.

If *owner* is not specified, it will be set to **monitor**.

Mode

Switch command, read-write.

Example

This example shows how to create RMON capture entry 1 to “listen” on channel 628:

```
B2(rw)->set rmon capture 1 628
```

clear rmon capture

Use this command to clears an RMON capture entry.

Syntax

clear rmon capture *index*

Parameters

index	Specifies the capture entry to be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear RMON capture entry 1:

```
B2(rw)->clear rmon capture 1
```

17

DHCP Server Configuration

This chapter describes the commands to configure the IPv4 DHCP server functionality on a SecureStack B2 switch.

For information about...	Refer to page...
DHCP Overview	17-1
Configuring General DHCP Server Parameters	17-3
Configuring IP Address Pools	17-11

DHCP Overview

Dynamic Host Configuration Protocol (DHCP) for IPv4 is a network layer protocol that implements automatic or manual assignment of IP addresses and other configuration information to client devices by servers. A DHCP server manages a user-configured pool of IP addresses from which it can make assignments upon client requests. A relay agent passes DHCP messages between clients and servers which are on different physical subnets.

DHCP Server

DHCP server functionality allows the SecureStack B2 switch to provide basic IP configuration information to a client on the network who requests such information using the DHCP protocol.

DHCP provides the following mechanisms for IP address allocation by a DHCP server:

- Automatic—DHCP server assigns an IP address to a client for a limited period of time (or until the client explicitly relinquishes the address) from a defined pool of IP addresses configured on the server.
- Manual—A client's IP address is assigned by the network administrator, and DHCP is used simply to convey the assigned address to the client. This is managed by means of "static" address pools configured on the server.

The amount of time that a particular IP address is valid for a system is called a lease. The SecureStack B2 maintains a lease database which contains information about each assigned IP address, the MAC address to which it is assigned, the lease expiration, and whether the address assignment is dynamic (automatic) or static (manual). The DHCP lease database is stored in flash memory.

In addition to assigning IP addresses, the DHCP server can also be configured to assign the following to requesting clients:

- Default router(s)
- DNS server(s) and domain name

- NetBIOS WINS server(s) and node name
- Boot file
- DHCP options as defined by RFC 2132

Note: A total of 16 address pools, dynamic and/or static, and a maximum of 256 addresses for the entire switch, can be configured on the SecureStack B2.

Configuring a DHCP Server

For DHCP to function on SecureStack B2 systems, the system has to "know about" the IP network for which the DHCP pool is to be created.

The following tasks provide basic DHCP server functionality when the DHCP pool is associated with the system's host IP address.

1. Configure the system (stack) host port IP address with the **set ip address** command. Once the system's IP address is configured, the system then "knows" about the configured subnet. For example:

   ```
   set ip address 192.0.0.50 mask 255.255.255.0
   ```

2. Enable DHCP server functionality on the system with the **set dhcp enable** command.
3. Configure an IP address pool for dynamic IP address assignment. The only *required* steps are to name the pool and define the network number and mask for the pool. Note that the pool has to be in the same subnet and use the same mask as the system host port IP address. For example:

   ```
   set dhcp pool auto-pool network 192.0.0.0 255.255.255.0
   ```

   All DHCP clients served by this switch must be in the same VLAN as the system's host port.

Optional DHCP server tasks include:

- You can limit the scope of addresses assigned to a pool for dynamic address assignment with the **set dhcp exclude** command. Up to 128 non-overlapping address ranges can be excluded on the SecureStack B2. For example:

  ```
  set dhcp exclude 192.0.0.1 192.0.0.10
  ```

  Note: The IP address of the system's host port is automatically excluded.

- Configure static address pools for manual address assignment. The only *required* steps are to name the pool, configure either the hardware address of the client or the client identifier, and configure the IP address and mask for the manual binding. For example:

  ```
  set dhcp pool static-pool hardware-address 0011.2233.4455
  set dhcp pool static-pool host 192.0.0.200 255.255.255.0
  ```

- Set other DHCP server parameters such as the number of ping packets to be sent before assigning an IP address, or enabling conflict logging.

Configuring General DHCP Server Parameters

Purpose

To configure DHCP server parameters, and to display and clear address binding information, server statistics, and conflict information.

Commands

For information about...	Refer to page...
set dhcp	17-3
set dhcp bootp	17-4
set dhcp conflict logging	17-4
show dhcp conflict	17-5
clear dhcp conflict	17-5
set dhcp exclude	17-6
clear dhcp exclude	17-7
set dhcp ping	17-7
clear dhcp ping	17-8
show dhcp binding	17-8
clear dhcp binding	17-9
show dhcp server statistics	17-9
clear dhcp server statistics	17-10

set dhcp

Use this command to enable or disable the DHCP server functionality on the SecureStack B2.

Syntax

```
set dhcp {enable | disable}
```

Parameters

enable | **disable**	Enables or disables DHCP server functionality. By default, DHCP server is disabled.

Defaults

None.

Mode

Switch command, read-write.

Example

This example enables DHCP server functionality.

```
B2(rw)->set dhcp enable
```

set dhcp bootp

Use this command to enable or disable automatic address allocation for BOOTP clients. By default, address allocation for BOOTP clients is disabled. Refer to RFC 1534, "Interoperation Between DHCP and BOOTP," for more information.

Syntax

set dhcp bootp {**enable** | **disable**}

Parameters

enable | **disable**	Enables or disables address allocation for BOOTP clients.

Defaults

None.

Mode

Switch command, read-write.

Example

This example enables address allocation for BOOTP clients.

```
B2(rw)->set dhcp bootp enable
```

set dhcp conflict logging

Use this command to enable conflict logging. By default, conflict logging is enabled. Use the **clear dhcp conflict logging** command to disable conflict logging.

Syntax

set dhcp conflict logging

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example enables DHCP conflict logging.

```
B2(rw)->set dhcp conflict logging
```

show dhcp conflict

Use this command to display conflict information, for one address or all addresses.

Syntax

show dhcp conflict [*address*]

Parameters

address	[Optional] Specifies the address for which to display conflict information.

Defaults

If no address is specified, conflict information for all addresses is displayed.

Mode

Read-only.

Example

This example displays conflict information for all addresses. Note that ping is the only detection method used.

```
B2(ro)->show dhcp conflict

IP address          Detection Method          Detection Time
-----------         -----------------         ---------------
192.0.0.2           Ping                      0 days 19h:01m:23s
192.0.0.3           Ping                      0 days 19h:00m:46s
192.0.0.4           Ping                      0 days 19h:01m:25s
192.0.0.12          Ping                      0 days 19h:01m:26s
```

clear dhcp conflict

Use this command to clear conflict information for one or all addresses, or to disable conflict logging.

Syntax

clear dhcp conflict {**logging** | *ip-address*| ***}**

Parameters

logging	Disables conflict logging.
ip-address	Clears the conflict information for the specified IP address.
*	Clears the conflict information for all IP addresses.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example disables DHCP conflict logging.

```
B2(rw)->clear dhcp conflict logging
```

This example clears the conflict information for the IP address 192.0.0.2.

```
B2(rw)->clear dhcp conflict 192.0.0.2
```

set dhcp exclude

Use this command to configure the IP addresses that the DHCP server should not assign to DHCP clients. Multiple address ranges can be configured but the ranges cannot overlap. Up to 128 non-overlapping address ranges can be excluded.

Syntax

`set dhcp exclude` *`low-ipaddr`* [*`high-ipaddr`*]

Parameters

low-ipaddr	Specifies the first IP address in the address range to be excluded from assignment.
high-ipaddr	(Optional) Specifies the last IP address in the address range to be excluded.

Defaults

None.

Mode

Switch command, read-write.

Example

This example first configures the address pool named “auto1” with 255 addresses for the Class C network 172,20.28.0, with the **set dhcp pool network** command. Then, the example limits the scope of the addresses that can be assigned by a DHCP server by excluding addresses 172.20.28.80 – 100, with the **set dhcp exclude** command.

```
B2(rw)->set dhcp pool auto1 network 172.20.28.0 24
B2(rw)->set dhcp exclude 172.20.28.80 172.20.28.100
```

clear dhcp exclude

Use this command to clear the configured IP addresses that the DHCP server should not assign to DHCP clients.

Syntax

clear dhcp exclude *low-ipaddr* [*high-ipaddr*]

Parameters

low-ipaddr	Specifies the first IP address in the address range to be cleared.
high-ipaddr	(Optional) Specifies the last IP address in the address range to be cleared.

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears the previously excluded range of IP addresses between 192.168.1.88 through 192.168.1.100.

```
B2(rw)->clear dhcp exclude 192.168.1.88 192.168.1.100
```

set dhcp ping

Use this command to configure the number of ping packets the DHCP server sends to an IP address before assigning the address to a requesting client.

Syntax

set dhcp ping packets *number*

Parameters

packets *number*	Specifies the number of ping packets to be sent. The value of number can be 0, or range from 2 to 10. Entering 0 disables this function. The default value is 2 packets.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the number of ping packets sent to 3.

```
B2(rw)->set dhcp ping packets 3
```

clear dhcp ping

Use this command to reset the number of ping packets sent by the DHCP server back to the default value of 2.

Syntax

clear dhcp ping packets

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example resets the number of ping packets sent back to the default value.

```
B2(rw)->clear dhcp ping packets
```

show dhcp binding

Use this command to display binding information for one or all IP addresses.

Syntax

show dhcp binding [*ip-address*]

Parameters

ip-address	(Optional) Specifies the IP address for which to display binding information.

Defaults

If no IP address is specified, binding information for all addresses is displayed.

Mode

Read-only.

Example

This example displays binding information about all addresses.

```
B2(rw)->show dhcp binding
IP address         Hardware Address     Lease Expiration     Type
-----------        -----------------    -----------------    -----
192.0.0.6          00:33:44:56:22:39    00:11:02            Automatic
192.0.0.8          00:33:44:56:22:33    00:10:22            Automatic
192.0.0.10         00:33:44:56:22:34    00:09:11            Automatic
192.0.0.11         00:33:44:56:22:35    00:10:05            Automatic
192.0.0.12         00:33:44:56:22:36    00:10:30            Automatic
```

```
192.0.0.13          00:33:44:56:22:37    infinite            Manual
192.0.0.14          00:33:44:56:22:38    infinite            Manual
```

clear dhcp binding

Use this command to clear (delete) one or all DHCP address bindings.

Syntax

clear dhcp binding {*ip-addr* | ***}**

Parameters

ip-addr	Specifies the IP address for which to clear/delete the DHCP binding.
*	Deletes all address bindings.

Defaults

None.

Mode

Switch command, read-write.

Example

This example deletes the DHCP address binding for IP address 192.168.1.1.

```
B2(rw)->clear dhcp binding 192.168.1.1
```

show dhcp server statistics

Use this command to display DHCP server statistics.

Syntax

show dhcp server statistics

Parameters

None.

Defaults

None.

Mode

Read-only.

Example

This example displays server statistics.

```
B2(ro)->show dhcp server statistics

Automatic Bindings                              36
Expired Bindings                                6
Malformed Bindings                              0
```

```
Messages                                    Received
----------                                  ----------
DHCP DISCOVER                                    382
DHCP REQUEST                                     3855
DHCP DECLINE                                     0
DHCP RELEASE                                     67
DHCP INFORM                                      1

Messages                                      Sent
----------                                    ------
DHCP OFFER                                      381
DHCP ACK                                        727
DHCP NACK                                       2
```

clear dhcp server statistics

Use this command to clear all DHCP server counters.

Syntax

`clear dhcp server statistics`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears all DHCP server counters.

```
B2(rw)->clear dhcp server statistics
```

Configuring IP Address Pools

Manual Pool Configuration Considerations

- The subnet of the IP address being issued should be on the same subnet as the ingress interface (that is, the subnet of the host IP address of the switch, or if routing interfaces are configured, the subnet of the routing interface).
- A manual pool can be configured using either the client's hardware address (**set dhcp pool hardware-address**) or the client's client-identifier (**set dhcp pool client-identifier**), but using both is not recommended.
- If the incoming DHCP request packet contains a client-identifier, then a manual pool configured with that client-identifier must exist on the switch in order for the request to be processed. The hardware address is not checked.
- A hardware address and type (Ethernet or IEEE 802) configured in a manual pool is checked only when a client-identifier is not also configured for the pool and the incoming DHCP request packet does not include a client-identifier option.

Purpose

To configure and clear DHCP address pool parameters, and to display address pool configuration information.

Note: A total of 16 address pools, dynamic and/or static, can be configured on the SecureStack B2.

Commands

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set dhcp pool

Use this command to create and assign a name to a DHCP server pool of addresses. Up to 16 address pools may be configured on a SecureStack B2. Note that entering this command is not required to create an address pool before configuring other address pool parameters.

Syntax

`set dhcp pool` *`poolname`*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example creates an address pool named “auto1.”

```
B2(rw)->set dhcp pool auto1
```

clear dhcp pool

Use this command to delete a DHCP server pool of addresses.

Syntax

clear dhcp pool *poolname*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example deletes the address pool named "auto1."

```
B2(rw)->clear dhcp pool auto1
```

set dhcp pool network

Use this command to configure the subnet number and mask for an automatic DHCP address pool.

Syntax

set dhcp pool *poolname* **network** *number* {*mask* | *prefix-length*}

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
number	Specifies an IP subnet for the address pool.
mask	Specifies the subnet mask in dotted quad notation.
prefix-length	Specifies the subnet mask as an integer.

Defaults

None.

Mode

Switch command, read-write.

Usage

Use this command to configure a set of IP addresses to be assigned by the DHCP server using the specified address pool. In order to limit the scope of the addresses configured with this command, use the set dhcp exclude command on page 17-6.

Examples

This example configures the IP subnet 172.20.28.0 with a prefix length of 24 for the automatic DHCP pool named "auto1." Alternatively, the mask could have been specified as 255.255.255.0.

```
B2(rw)->set dhcp pool auto1 network 172.20.28.0 24
```

This example limits the scope of 255 addresses created for the Class C network 172,20.28.0 by the previous example, by excluding addresses 172.20.28.80 – 100.

```
B2(rw)->set dhcp exclude 172.20.28.80 172.20.28.100
```

clear dhcp pool network

Use this command to remove the network number and mask of a DHCP server pool of addresses.

Syntax

clear dhcp pool *poolname* **network**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example deletes the network and mask from the address pool named "auto1."

```
B2(rw)->clear dhcp pool auto1 network
```

set dhcp pool hardware-address

Use this command to configure the MAC address of the DHCP client and create an address pool for manual binding. You can use either this command or the **set dhcp pool client-identifier** command to create a manual binding pool, but using both is not recommended.

Syntax

set dhcp pool *poolname* **hardware-address** *hw-addr* [*type*]

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
hw-addr	Specifies the MAC address of the client's hardware platform. This value can be entered using dotted hexadecimal notation or colons.
type	(Optional) Specifies the protocol of the hardware platform. Valid values are 1 for Ethernet or 6 for IEEE 802. Default value is 1, Ethernet.

Defaults

If no *type* is specified, Ethernet is assumed.

Mode

Switch command, read-write.

Example

This example specifies 0001.f401.2710 as the Ethernet MAC address for the manual address pool named "manual1." Alternatively, the MAC address could have be entered as 00:01:f4:01:27:10.

```
B2(rw)->set dhcp pool manual1 hardware-address 0001.f401.2710
```

clear dhcp pool hardware-address

Use this command to remove the hardware address of a DHCP client from a manual binding address pool.

Syntax

clear dhcp pool *poolname* **hardware-address**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example deletes the client hardware address from the address pool named "manual1."

```
B2(rw)->clear dhcp pool manual1 hardware-address
```

set dhcp pool host

Use this command to configure an IP address and network mask for a manual DHCP binding.

Syntax

set dhcp pool *poolname* **host** *ip-address* [*mask* | *prefix-length*]

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
ip-address	Specifies the IP address for manual binding.

mask	(Optional) Specifies the subnet mask in dotted quad notation.
prefix-length	(Optional) Specifies the subnet mask as an integer.

Defaults

If a mask or prefix is not specified, the class A, B, or C natural mask will be used.

Mode

Switch command, read-write.

Example

This example shows how to configure the minimum requirements for a manual binding address pool. First, the hardware address of the client's hardware platform is configured, followed by configuration of the address to be assigned to that client manually.

```
B2(rw)->set dhcp pool manual1 hardware-address 0001.f401.2710
B2(rw)->set dhcp pool manual1 host 15.12.1.99 255.255.248.0
```

clear dhcp pool host

Use this command to remove the host IP address from a manual binding address pool.

Syntax

clear dhcp pool *poolname* **host**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example deletes the host IP address from the address pool named "manual1."

```
B2(rw)->clear dhcp pool manual1 host
```

set dhcp pool client-identifier

Use this command to configure the client identifier of the DHCP client and create an address pool for manual binding. You can use either this command or the **set dhcp pool hardware-address** command to create a manual binding pool, but using both is not recommended.

Syntax

set dhcp pool *poolname* **client-identifier** *id*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
id	Specifies the unique client identifier for this client. The value must be entered in xx:xx:xx:xx:xx:xx format.

Defaults

None.

Mode

Switch command, read-write.

Usage

The client identifier is formed by concatenating the media type and the MAC address. For example, if the client hardware type is Ethernet and the client MAC address is 00:01:22:33:44:55, then the client identifier configured with this command must be 01:00:01:22:33:44:55.

Example

This example shows how to configure the minimum requirements for a manual binding address pool, using a client identifier rather than the hardware address of the client's hardware platform.

```
B2(rw)->set dhcp pool manual2 client-identifier 01:00:01:22:33:44:55
B2(rw)->set dhcp pool manual2 host 10.12.1.10 255.255.255.0
```

clear dhcp pool client-identifier

Use this command to remove the unique identifier of a DHCP client from a manual binding address pool.

Syntax

`clear dhcp pool` *`poolname`* **`client-identifier`**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example deletes the client identifier from the address pool named "manual1."

```
B2(rw)->clear dhcp pool manual1 client-identifier
```

set dhcp pool client-name

Use this command to assign a name to a DHCP client when creating an address pool for manual binding.

Syntax

set dhcp pool *poolname* **client-name** *name*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
name	Specifies the name to be assigned to this client. Client names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example configures the client name "appsvr1" to the manual binding pool "manual2."

```
B2(rw)->set dhcp pool manual2 client-identifier 01:22:33:44:55:66
B2(rw)->set dhcp pool manual2 host 10.12.1.10 255.255.255.0
B2(rw)->set dhcp pool manual2 client-name appsvr1
```

clear dhcp pool client-name

Use this command to delete a DHCP client name from an address pool for manual binding.

Syntax

clear dhcp pool *poolname* **client-name**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example deletes the client name from the manual binding pool "manual2."

```
B2(rw)->clear dhcp pool manual2 client-name
```

set dhcp pool bootfile

Use this command to specify a default boot image for the DHCP clients who will be served by the address pool being configured.

Syntax

set dhcp pool *poolname* **bootfile** *filename*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
filename	Specifies the boot image file name.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets the boot image filename for address pool named "auto1."

```
B2(rw)->set dhcp pool auto1 bootfile image1.img
```

clear dhcp pool bootfile

Use this command to remove a default boot image from the address pool being configured.

Syntax

clear dhcp pool *poolname* **bootfile**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes the boot image filename from address pool named "auto1."

```
B2(rw)->clear dhcp pool auto1 bootfile
```

set dhcp pool next-server

Use this command to specify the file server from which the default boot image is to be loaded by the client.

Syntax

set dhcp pool *poolname* **next-server** *ip-address*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
ip-address	Specifies the IP address of the file server the DHCP client should contact to load the default boot image.

Defaults

None.

Mode

Switch command, read-write.

Example

This example specifies the file server from which clients being served by address pool "auto1" should download the boot image file "image1.img."

```
B2(rw)->set dhcp pool auto1 bootfile image1.img
B2(rw)->set dhcp pool auto1 next-server 10.1.1.10
```

clear dhcp pool next-server

Use this command to remove the boot image file server from the address pool being configured.

Syntax

clear dhcp pool *poolname* **next-server**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes the file server from address pool "auto1."

```
B2(rw)->clear dhcp pool auto1 next-server
```

set dhcp pool lease

Use this command to specify the duration of the lease for an IP address assigned by the DHCP server from the address pool being configured.

Syntax

set dhcp pool *poolname* **lease** {*days* [*hours* [*minutes*]] | **infinite**}

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
days	Specifies the number of days an address lease will remain valid. Value can range from 0 to 59.
hours	(Optional) When a *days* value has been assigned, specifies the number of hours an address lease will remain valid. Value can range from 0 to 1439.
minutes	(Optional) When a *days* value and an *hours* value have been assigned, specifies the number of minute an address lease will remain valid. Value can range from 0 to 86399.
infinite	Specifies that the duration of the lease will be unlimited.

Defaults

If no lease time is specified, a lease duration of 1 day is configured.

Mode

Switch command, read-write.

Example

This example configures a lease duration of 12 hours for the address pool being configured. Note that to configure a lease time less than one day, enter 0 for days, then the number of hours and minutes.

```
B2(rw)->set dhcp pool auto1 lease 0 12
```

clear dhcp pool lease

Use this command to restore the default lease time value of one day for the address pool being configured.

Syntax

clear dhcp pool *poolname* **lease**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

Clears the lease time for this address pool to the default value of one day.

Mode

Switch command, read-write.

Example

This example restores the default lease duration of one day for address pool "auto1."

```
B2(rw)->clear dhcp pool auto1 lease
```

set dhcp pool default-router

Use this command to specify a default router list for the DHCP clients served by the address pool being configured. Up to 8 default routers can be configured.

Syntax

set dhcp pool *poolname* **default-router** *address* [*address2 ... address8*]

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
address	Specifies the IP address of a default router.
address2 ... address8	(Optional) Specifies, in order of preference, up to 7 additional default router addresses.

Defaults

None.

Mode

Switch command, read-write.

Example

This example assigns a default router at 10.10.10.1 to the address pool named "auto1."

```
B2(rw)->set dhcp pool auto1 default-router 10.10.10.1
```

clear dhcp pool default-router

Use this command to delete the default routers configured for this address pool.

Syntax

clear dhcp pool *poolname* **default-router**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes the default router from the address pool "auto1."

```
B2(rw)->clear dhcp pool auto1 default-router
```

set dhcp pool dns-server

Use this command to specify one or more DNS servers for the DHCP clients served by the address pool being configured. Up to 8 DNS servers can be configured.

Syntax

set dhcp pool *poolname* **dns-server** *address* [*address2 ... address8*]

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
address	Specifies the IP address of a DNS server.
address2 ... address8	(Optional) Specifies, in order of preference, up to 7 additional DNS server addresses.

Defaults

None.

Mode

Switch command, read-write.

Example

This example assigns a DNS server at 10.14.10.1 to the address pool "'auto1."

```
B2(rw)->set dhcp pool auto1 dns-server 10.14.10.1
```

clear dhcp pool dns-server

Use this command to remove the DNS server list from the address pool being configured.

Syntax

clear dhcp pool *poolname* **dns-server**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes the DNS server list from the address pool "auto1."

```
B2(rw)->clear dhcp pool auto1 dns-server
```

set dhcp pool domain-name

Use this command to specify a domain name to be assigned to DHCP clients served by the address pool being configured.

Syntax

set dhcp pool *poolname* **domain-name** *domain*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
domain	Specifies the domain name string. The domain name can be up to 255 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example assigns the "mycompany.com" domain name to the address pool "auto1."

```
B2(rw)->set dhcp pool auto1 domain-name mycompany.com
```

clear dhcp pool domain-name

Use this command to remove the domain name from the address pool being configured.

Syntax

clear dhcp pool *poolname* **domain-name**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes the domain name from the address pool "auto1."

```
B2(rw)->clear dhcp pool auto1 domain-name
```

set dhcp pool netbios-name-server

Use this command to assign one or more NetBIOS name servers for the DHCP clients served by the address pool being configured. Up to 8 NetBIOS name servers can be configured.

Syntax

set dhcp pool *poolname* **netbios-name-server** *address* [*address2 ... address8*]

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
address	Specifies the IP address of a NetBIOS name server.
address2 ... address8	(Optional) Specifies, in order of preference, up to 7 additional NetBIOS name server addresses.

Defaults

None.

Mode

Switch command, read-write.

Example

This example assigns a NetBIOS name server at 10.15.10.1 to the address pool being configured.

```
B2(rw)->set dhcp pool auto1 netbios-name-server 10.15.10.1
```

clear dhcp pool netbios-name-server

Use this command to remove the NetBIOS namer server list from the address pool being configured.

clear dhcp pool *poolname* **netbios-name-server**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes the NetBIOS name server list from the address pool auto1.

```
B2(rw)->clear dhcp pool auto1 netbios-name-server
```

set dhcp pool netbios-node-type

Use this command to specify a NetBIOS node (server) type for the DHCP clients served by the address pool being configured.

Syntax

`set dhcp pool` *`poolname`* **`netbios-node-type {b-node | h-node | p-node | m-node}`**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
b-node	Specifies the NetBIOs node type to be broadcast (no WINS).
h-node	Specifies the NetBIOs node type to be hybrid (WINS, then broadcast).
p-node	Specifies the NetBIOs node type to be peer (WINS only).
m-node	Specifies the NetBIOs node type to be mixed (broadcast, then WINS).

Defaults

None.

Mode

Switch command, read-write.

Example

This example specifies hybrid as the NetBIOS node type for the address pool “auto1.”

```
B2(rw)->set dhcp pool auto1 netbios-node-type h-node
```

clear dhcp pool netbios-node-type

Use this command to remove the NetBIOS node type from the address pool being configured.

Syntax

`clear dhcp pool` *`poolname`* **`netbios-node-type`**

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes the NetBIOS node type from the address pool "auto1."

```
B2(rw)->clear dhcp pool auto1 netbios-node-type
```

set dhcp pool option

Use this command to configure DHCP options, described in RFC 2132.

Syntax

set dhcp pool *poolname* **option** *code* {**ascii** *string* | **hex** *string-list* | **ip** *address-list*}

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
code	Specifies the DHCP option code, as defined in RFC 2132. Value can range from 1 to 254.
ascii *string*	Specifies the data in ASCII format. An ASCII character string containing a space must be enclosed in quotations.
hex *string-list*	Specifies the data in HEX format. Up to 8 HEX strings can be entered.
ip *address-list*	Specifies the data in IP address format. Up to 8 IP addresses can be entered.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example configures DHCP option 19, which specifies whether the client should configure its IP layer for packet forwarding. In this case, IP forwarding is enabled with the 01 value.

```
B2(rw)->set dhcp pool auto1 option 19 hex 01
```

This example configures DHCP option 72, which assigns one or more Web servers for DHCP clients. In this case, two Web server addresses are configured.

```
B2(rw)->set dhcp pool auto1 option 72 ip 168.24.3.252 168.24.3.253
```

clear dhcp pool option

Use this command to remove a DHCP option from the address pool being configured.

Syntax

clear dhcp pool *poolname* **option** *code*

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.
code	Specifies the DHCP option code, as defined in RFC 2132. Value can range from 1 to 254.

Defaults

None.

Mode

Switch command, read-write.

Example

This example removes option 19 from address pool "auto1."

```
B2(rw)->clear dhcp pool auto1 option 19
```

show dhcp pool configuration

Use this command to display configuration information for one or all address pools.

Syntax

show dhcp pool configuration {*poolname* | **all**}

Parameters

poolname	Specifies the name of the address pool. Pool names may be up to 31 characters in length.

Defaults

None.

Mode

Read-only.

Example

This example displays configuration information for all address pools.

```
B2(rw)->show dhcp pool configuration all

Pool: Atg_Pool
Pool Type                                        Dynamic
```

```
Network                                 192.0.0.0 255.255.255.0
Lease Time                              1 days 0 hrs 0 mins
Default Routers                         192.0.0.1

Pool: static1
Pool Type                               Manual
Client Name                             appsvr1
Client Identifier                       01:00:01:f4:01:27:10
Host                                    10.1.1.1 255.0.0.0
Lease Time                              infinite
Option                                  19 hex 01

Pool: static2
Pool Type                               Manual
Hardware Address                        00:01:f4:01:27:10
Hardware Address Type                   ieee802
Host                                    192.168.10.1 255.255.255.0
Lease Time                              infinite
```

18

DHCP Snooping and Dynamic ARP Inspection

This chapter describes two security features:

- DHCP snooping, which monitors DHCP messages between a DHCP client and DHCP server to filter harmful DHCP messages and to build a database of authorized address bindings
- Dynamic ARP inspection, which uses the bindings database created by the DHCP snooping feature to reject invalid and malicious ARP packets

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DHCP Snooping Overview

DHCP snooping monitors DHCP messages between DHCP clients and DHCP servers to filter harmful DHCP messages and to build a bindings database of {MAC address, IP address, VLAN ID, port} tuples that are considered authorized.

DHCP snooping is disabled globally and on all VLANs by default. Ports are untrusted by default. DHCP snooping must be enabled globally and on specific VLANs. Ports within the VLANs must be configured as trusted or untrusted. DHCP servers must be reached through trusted ports.

DHCP snooping enforces the following security rules:

- DHCP packets from a DHCP server (DHCP OFFER, DHCP ACK, DHCP NAK) are dropped if received on an untrusted port.
- DHCP RELEASE and DHCP DECLINE messages are dropped if they are for a MAC address in the snooping database but the binding's interface in the database is different from the interface where the message was received.
- On untrusted interfaces, the switch drops DHCP packets whose source MAC address does not match the client hardware address. This feature is a configurable option.

DHCP Message Processing

The hardware identifies all incoming DHCP packets on ports where DHCP snooping is enabled. On untrusted ports, the hardware traps all incoming DHCP packets to the CPU. On trusted ports,

the hardware forwards client messages and copies server messages to the CPU so DHCP snooping can learn the binding.

The DHCP snooping application processes incoming DHCP messages. For DHCP RELEASE and DHCP DECLINE messages, the application compares the receive interface and VLAN with the client's interface and VLAN in the bindings database. If the interfaces do not match, the application logs the event and drops the message. For valid client messages, DHCP snooping compares the source MAC address to the DHCP client hardware address. Where there is a mismatch, DHCP snooping logs and drops the packet. You can disable this feature using the **set dhcpsnooping verify mac-address disable** command.

Note: If the switch has been configured as a DHCP relay agent, to forward client requests to a DHCP server that does not reside on the same broadcast domain as the client, MAC address verification should be disabled in order to allow DHCP RELEASE packets to be processed by the DHCP snooping functionality and client bindings removed from the bindings database.

DHCP snooping can be configured on switching VLANs and routing VLANs. When a DHCP packet is received on a routing VLAN, the DHCP snooping application applies its filtering rules and updates the bindings database. If a client message passes filtering rules, the message is placed into the software forwarding path, where it may be processed by the DHCP relay agent, the local DHCP server, or forwarded as an IP packet.

DHCP snooping forwards valid DHCP client messages received on non-routing VLANs. The message is forwarded on all trusted interfaces in the VLAN. If a DHCP relay agent or local DHCP server co-exist with the DHCP snooping feature, DHCP client messages will be sent to the DHCP relay agent or local DHCP server to process further.

The DHCP snooping application does not forward server messages since they are forwarded in hardware.

Building and Maintaining the Database

The DHCP snooping application uses DHCP messages to build and maintain the bindings database. The bindings database includes only data for clients on untrusted ports. The bindings database includes the following information for each entry:

- Client MAC address
- Client IP address
- Time when client's lease expires
- Client VLAN ID
- Client port

DHCP snooping creates a tentative binding from DHCP DISCOVER and REQUEST messages. Tentative bindings tie a client to a port (the port where the DHCP client message was received). Tentative bindings are completed when DHCP snooping learns the client's IP address from a DHCP ACK message on a trusted port. DHCP snooping removes bindings in response to DECLINE, RELEASE, and NACK messages. The DHCP snooping application ignores the ACK messages sent in reply to the DHCP Inform messages received on trusted ports. You can also enter static bindings into the bindings database.

When a switch learns of new bindings or when it loses bindings, the switch immediately updates the entries in the database.

If the absolute lease time of a snooping database entry expires, then that entry will be removed. Care should be taken to ensure that system time is consistent across the reboots. Otherwise, snooping entries will not expire properly. If a host sends a DHCP RELEASE message while the

switch is rebooting, when the switch receives a DHCP DISCOVERY or REQUEST message, the client's binding will go to a tentative binding state.

Rate Limiting

To protect the switch against DHCP attacks when DHCP snooping is enabled, the snooping application enforces a rate limit for DHCP packets received on untrusted interfaces. DHCP snooping monitors the receive rate on each interface separately. If the receive rate exceeds a configurable limit, DHCP snooping brings down the interface. Use the **set port enable** command to re-enable the interface. Both the rate and the burst interval can be configured.

Basic Configuration

The following configuration procedure does not change the write delay to the snooping database or any of the default rate limiting values. Additional configuration notes follow this procedure.

Procedure 18-1 Basic Configuration for DHCP Snooping

Step	Task	Command(s)
1.	Enable DHCP snooping globally on the switch.	**set dhcpsnooping enable**
2.	Determine where DHCP clients will be connected and enable DHCP snooping on their VLANs.	**set dhcpsnooping vlan** *vlan-list* **enable**
3.	Determine which ports will be connected to the DHCP server and configure them as trusted ports.	**set dhcpsnooping trust port** *port-string* **enable**
4.	If desired, enable logging of invalid DHCP messages on specfic ports.	**set dhcpsnooping log-invalid port** *port-string* **enable**
5.	If desired, add static bindings to the database.	**set dhcpsnooping binding** *mac-address* **vlan** *vlan-id ipaddr* **port** *port-string*

Configuration Notes

DHCP Server

- When the switch is operating in switch mode, then the DHCP server and DHCP clients must be in the same VLAN.
- If the switch is in routing mode (on those platforms that support routing), then the DCHP server can be remotely connected to a routing interface, or running locally.
- If the DHCP server is remotely connected, then the use of an IP helper address is required and MAC address verification should be disabled (**set dhcpsnooping verify mac-address disable**).
- The DHCP server must use Scopes in order to provide the IP addresses per VLAN.
- DHCP snooping must be enabled on the interfaces where the DHCP clients are connected, and the interfaces must be untrusted DHCP snooping ports.
- The routing interface that is connected to the DHCP server must be enabled for DHCP snooping and must be a trusted DHCP snooping port.

DHCP Snooping Commands

For information about...	Refer to page...
set dhcpsnooping	18-5
set dhcpsnooping vlan	18-5
set dhcpsnooping database write-delay	18-6
set dhcpsnooping trust	18-6
set dhcpsnooping binding	18-7
set dhcpsnooping verify	18-8
set dhcpsnooping log-invalid	18-9
set dhcpsnooping limit	18-10
show dhcpsnooping	18-11
show dhcpsnooping database	18-11
show dhcpsnooping port	18-12
show dhcpsnooping binding	18-13
show dhcpsnooping statistics	18-13
clear dhcpsnooping binding	18-14
clear dhcpsnooping statistics	18-15
clear dhcpsnooping database	18-15
clear dhcpsnooping limit	18-16

set dhcpsnooping

Use this command to enable or disable DHCP snooping globally.

Syntax

set dhcpsnooping {**enable** | **disable**}

Parameters

enable	Enable DHCP snooping globally on the switch.
disable	Disable DHCP snooping globally on the switch.

Defaults

Disabled globally.

Mode

Switch command, read-write.

Usage

By default, DHCP snooping is disabled globally and on all VLANs. You must enable it globally with this command, and then enable it on specific VLANs.

Example

The following example enables DHCP snooping globally.

```
B2(rw)->set dhcpsnooping enable
```

set dhcpsnooping vlan

Use this command to enable or disable DHCP snooping on a VLAN or range of VLANs.

Syntax

set dhcpsnooping vlan *vlan-range* {**enable** | **disable**}

Parameters

vlan-range	Specifies the VLAN or range of VLANs on which DHCP snooping is to be enabled or disabled.
enable | **disable**	Enables or disables DHCP snooping for the specified VLANs.

Defaults

DHCP snooping is disabled by default on all VLANs.

Mode

Switch command, read-write.

Usage

By default, DHCP snooping is disabled globally and on all VLANs. You must enable it globally with the **set dhcpsnooping** command, and then enable it on specific VLANs with this command.

Example

This example enables DHCP snooping on VLANS 10 through 20.

```
B2(rw)->set dhcpsnooping vlan 10-20 enable
```

set dhcpsnooping database write-delay

Use this command to specify the interval between updates to the stored bindings database.

Syntax

set dhcpsnooping database write-delay *seconds*

Parameters

second	Specify the interval in seconds between updates to the stored bindings database. The value can range from 15 to 86400 seconds.

Defaults

Every 5 minutes (300 seconds).

Mode

Switch command, read-write.

Usage

When a switch learns of new bindings or when it loses bindings, the switch updates the entries in the bindings database according to the write delay timer. The switch also updates the entries in the binding file. The frequency at which the file is updated is based on the delay configured with this command, and the updates are batched.

Example

The following example specifies that the stored database should be updated once an hour.

```
B2(rw)->set dhcpsnooping database write-delay 3600
```

set dhcpsnooping trust

Use this command to enable or disable a port as a DHCP snooping trusted port.

Syntax

set dhcpsnooping trust port *port-string* {**enable** | **disable**}

Parameters

port *port-string*	Specifies the port or ports to be enabled or disabled as trusted ports. The ports can be physical ports or LAGs that are members of a VLAN.

enable | **disable**	Enables or disables the specified ports as trusted ports.

Defaults

By default, ports are untrusted.

Mode

Switch command, read-write.

Usage

In order for DHCP snooping to operate, snooping has to be enabled globally and on specific VLANs, and the ports within the VLANs have to be configured as trusted or untrusted. On trusted ports, DHCP client messages are forwarded directly by the hardware. On untrusted ports, client messages are given to the DHCP snooping application.

The DHCP snooping application builds the bindings database from client messages received on untrusted ports. DHCP snooping creates a "tentative binding" from DHCP DISCOVER and REQUEST messages. Tentative bindings tie a client to the port on which the message packet was received. Tentative bindings are completed when DHCP snooping learns the client's IP address from a DHCP ACK message on a trusted port.

The ports on the switch through which DHCP servers are reached must be configured as trusted ports so that packets received from those ports will be forwarded to clients. DCHP packets from a DHCP server (DHCP OFFER, DHCP ACK, DHCP NAK) are dropped if received on an untrusted port.

Example

This example configures port ge.1.1 as a trusted port.

```
B2(rw)->set dhcpsnooping trust port ge.1.1 enable
```

set dhcpsnooping binding

Use this command to add a static DHCP binding to the DHCP snooping database.

Syntax

set dhcpsnooping binding *mac-address* **vlan** *vlan-id ipaddr* **port** *port-string*

Parameters

mac-address	Specifies the MAC address of the binding entry.
vlan *vlan-id*	Specifies the VLAN of the binding entry.
ipaddr	Specifies the IP address of the binding entry.
port *port-string*	Specifies the port of the binding entry.

Defaults

None.

Mode

Switch command, read-write.

Usage

When enabled globally and on VLANs, DHCP snooping builds its bindings database from DHCP client messages received on untrusted ports. Such entries in the database are dynamic entries which will be removed in response to valid DECLINE, RELEASE, and NACK messages or when the absolute lease time of the entry expires.

You can add static entries to the bindings database with this command.

Example

This example creates a static entry, associating MAC address 00:01:02:33:44:55 with IP address 192.168.10.10 and VLAN 10, port ge.1.1.

```
B2(rw)->set dhcpsnooping binding 00:01:02:33:44:55 vlan 10 192.168.10.10 port
ge.1.1
```

set dhcpsnooping verify

Use this command to enable or disable DHCP snooping to filter on source MAC address.

Syntax

set dhcpsnooping verify mac-address {**enable** | **disable**}

Parameters

enable	Enables verification of the source MAC address in client messages against the client hardware address.
disable	Disables verification of the source MAC address in client messages against the client hardware address.

Defaults

Source MAC address verification is enabled by default.

Mode

Switch command, read-write.

Usage

When this verification is enabled, the DHCP snooping application compares the source MAC address contained in valid client messages with the client's hardware address. If there is a mismatch, DHCP snooping logs the event and drops the packet.

Use the **show dhcpsnooping** command to display the status (enabled or disabled) of source MAC address verification for each interface in an enabled VLAN. The **show dhcpsnooping statistics** command shows the actual number of MAC verification errors that occurred on untrusted ports.

Example

This example disables source MAC address verification and logging.

```
B2(rw)->set dhcpsnooping verify mac-address disable
```

set dhcpsnooping log-invalid

Use this command to enable or disable logging of invalid DHCP messages on ports.

Syntax

set dhcpsnooping log-invalid port *port-string* {**enable** | **disable**}

Parameters

port *port-string*	Specifies the port or ports on which to enable or disable logging of invalid packets.
enable | **disable**	Enables or disables logging on the specified ports.

Defaults

Disabled.

Mode

Switch command, read-write.

Usage

The DHCP snooping application processes incoming DHCP messages. For DHCPRELEASE and DHCPDECLINE messages, the application compares the receive interface and VLAN with the client's interface and VLAN in the bindings database. If the interfaces do not match, the application logs the event if logging has been enabled.

Use the **show dhcpsnooping** command to display the status (enabled or disabled) of logging invalid packets for each interface in an enabled VLAN. The **show dhcpsnooping statistics** command shows the actual number of server messages received on untrusted ports.

Example

This example enables logging of invalid DHCP messages on port ge.1.1 and then displays the DHCP configuration settings.

```
B2(rw)->set dhcpsnooping log invalid port ge.1.1 enable
B2(su)->show dhcpsnooping
DHCP snooping is Disabled
DHCP snooping source MAC verification is enabled
DHCP snooping is enabled on the following VLANs:
3

 Interface    Trusted     Log Invalid Pkts
-----------  ----------   ----------------
ge.1.1       No           Yes
ge.1.2       No           No
ge.1.3       Yes          No
```

set dhcpsnooping limit

Use this command to configure rate limiting parameters for incoming DHCP packets on a port or ports.

Syntax

set dhcpsnooping limit *port-string* {**none** | **rate** *pps* {**burst interval** *secs*]}

Parameters

port-string	Specifies the port or ports to which to apply these rate limiting parameters.
none	Configures no limit on incoming DHCP packets.
rate *pps*	Specifies a rate limit in packets per second. The value of *pps* can range from 0 to 100 packets per second.
burst interval *secs*	Specifies a burst interval in seconds. The value of *secs* can range from 1 to 15 seconds.

Defaults

Rate = 15 packets per second

Burst Interval = 1 second

Mode

Switch command, read-write.

Usage

To protect the switch from DHCP attacks when DHCP snooping is enabled, the snooping application enforces a rate limit for DHCP packets received on untrusted interfaces. DHCP snooping monitors the receive rate on each interface separately. If the receive rate exceeds the configured limit, DHCP snooping brings down the interface. You can re-enable the interface with the **set port enable** command. Both the rate and the burst interval can be configured.

You can display the currently configured rate limit parameters with the **show dhcpsnooping port** command.

Example

This example configures rate limit parameters on port ge.1.1.

```
B2(rw)->set dhcpsnooping limit ge.1.1 rate 20 burst interval 2
B2(rw)->show dhcpsnooping port ge.1.1
Interface     Trust State     Rate Limit      Burst Interval
                                 (pps)           (seconds)
----------   -------------   -------------   ---------------
    ge.1.1              No              20                2
```

show dhcpsnooping

Use this command to display DHCP snooping configuration parameters.

Syntax

show dhcpsnooping

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Usage

This command displays the status (enabled or disabled) of DHCP snooping globally, lists the VLANs on which DHCP snooping is enabled, displays whether source MAC address verification is enabled or disabled, and for ports that are enabled for snooping, displays whether they are trusted or untrusted and whether logging of invalid packets has been enabled.

Example

This example shows the output of the **show dhcpsnooping** command.

```
B2(su)->show dhcpsnooping
DHCP snooping is Enabled
DHCP snooping source MAC verification is enabled
DHCP snooping is enabled on the following VLANs:
3

 Interface    Trusted     Log Invalid Pkts
-----------  ----------   ----------------
ge.1.47      Yes          No
ge.1.48      No           No
lag.0.1      No           No
```

show dhcpsnooping database

Use this command to display DHCP snooping database configuration parameters.

Syntax

show dhcpsnooping database

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Usage

This command displays where the database file is stored (locally) and what the write delay value is.

Example

This example shows the output of the **show dhcpsnooping database** command.

```
B2(su)->show dhcpsnooping database
agent url:  local

write-delay:  300
```

show dhcpsnooping port

Use this command to display DHCP snooping configuration parameters for specific ports.

Syntax

show dhcpsnooping port *port-string*

Parameters

port-string	Specifies the port or ports for which to display configuration information.

Defaults

None.

Mode

Switch command, read-write.

Usage

This command displays the trust state and rate limiting parameters configured on the specified ports.

Example

This example shows the output of the **show dhcpsnooping port** command.

```
B2(su)->show dhcpsnooping port ge.1.1
Interface     Trust State     Rate Limit      Burst Interval
                                 (pps)           (seconds)
----------   -------------   -------------   ---------------
    ge.1.1              No              20                 2
```

show dhcpsnooping binding

Use this command to display the contents of the DHCP snooping bindings database.

Syntax

show dhcpsnooping binding [**dynamic** | **static**] [**port** *port-string*] [**vlan** *vlan-id*]

Parameters

dynamic | **static**	(Optional) Limits the display of bindings in the database by type of entry, either dynamic or static.
port *port-string*	(Optional) Limits the display of bindings in the database by port.
vlan *vlan-id*	(Optional) Limits the display of bindings in the database by VLAN id.

Defaults

If no parameters are entered, all bindings in the database are displayed.

Mode

Switch command, read-write.

Usage

This command displays information about the DHCP bindings in the DHCP snooping database.

Example

This example shows the output of the **show dhcpsnooping binding** command when no parameters are entered.

```
B2(su)->show dhcpsnooping binding
Total number of bindings:  2

   MAC Address       IP Address     VLAN   Interface    Type    Lease (min)
-----------------  ---------------  ----  -----------  -------  -----------
00:02:B3:06:60:80    192.168.10.10     3       ge.1.1   STATIC
00:0F:FE:00:13:04    192.168.20.1      5      ge.1.30   DYNAMIC  1440
```

show dhcpsnooping statistics

Use this command to display DHCP snooping statistics for untrusted ports.

Syntax

show dhcpsnooping statistics

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Usage

The DHCP snooping application processes incoming DHCP messages on enabled untrusted interfaces. For DHCP RELEASE and DHCP DECLINE messages, the application compares the receive interface and VLAN with the client's interface and VLAN in the bindings database. If the interfaces do not match, the application logs the event (if logging of invalid messages is enabled) and drops the message. If source MAC verification is enabled, for valid client messages, DHCP snooping compares the source MAC address to the DHCP client hardware address. Where there is a mismatch, DHCP snooping logs and drops the packet.

This command displays, for each enabled untrusted interface, the number of source MAC verification failures and client interface mismatches that occurred since the last time these statistics were cleared.

Since DHCP servers should not be connected through an untrusted port, the DHCP snooping application will drop incoming DHCP server messages on untrusted interfaces and increment a counter that is displayed with this command.

Example

This example shows the output of the **show dhcpsnooping statistics** command.

```
B2(su)->show dhcpsnooping statistics
 Interface    MAC Verify   Client Ifc   DHCP Server
               Failures     Mismatch    Msgs Rec'd
-----------   ----------   ----------   -----------
ge.1.48               0            0             0
lag.0.1               0            0             0
```

clear dhcpsnooping binding

Use this command to remove bindings from the DHCP snooping bindings database.

Syntax

clear dhcpsnooping binding [**port** *port-string* | **mac** *mac-addr*]

Parameters

port *port-string*	(Optional) Specifies the entry or entries to remove by port identifier.
mac *mac-addr*	(Optional) Specifies the entry to remove by MAC address.

Defaults

If no parameters are entered, all bindings (static and dynamic) are removed.

Mode

Switch command, read-write.

Example

This example clears the static binding entry that includes port ge.1.2.

```
B2(su)->clear dhcpsnooping binding port ge.1.2
```

clear dhcpsnooping statistics

Use this command to clear the DHCP snooping statistics counters.

Syntax

`clear dhcpsnooping statistics`

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears the DHCP snooping statistics counters for all enabled untrusted ports.

```
B2(su)->clear dhcpsnooping statistics
```

clear dhcpsnooping database

Use this command to return the write delay value to its default value of 300 seconds.

Syntax

`clear dhcpsnooping database` [**`write-delay`**]

Parameters

write-delay	(Optional) Specifies that the write delay value should be returned to the default value of 300 seconds.

Defaults

None.

Mode

Switch command, read-write.

Usage

This command will set the database write delay value to the default of 300 seconds.

Example

This example sets the database storage location to the default of local.

```
B2(su)->clear dhcpsnooping database
```

clear dhcpsnooping limit

Use this command to reset the rate limit values to the defaults of 15 packets per second with a burst interval of 1 second.

Syntax

clear dhcpsnooping limit *port-string*

Parameters

port-string	Specifies the port or ports to which this command applies.

Defaults

None.

Mode

Switch command, read-write.

Example

This example resets the rate limit values to their defaults on port ge.1.1.

```
B2(su)->clear dhcpsnooping limit ge.1.1
```

Dynamic ARP Inspection Overview

Dynamic ARP inspection (DAI) is a security feature that rejects invalid and malicious ARP packets. The feature prevents a class of man-in-the-middle attacks where an unfriendly station intercepts traffic for other stations by poisoning the ARP caches of its unsuspecting neighbors. ARP poisoning is a tactic where an attacker injects false ARP packets into the subnet, normally by broadcasting ARP responses in which the attacker claims to be someone else. By poisoning the ARP cache, a malicious user can intercept the traffic intended for other hosts on the network.

The Dynamic ARP Inspection application performs ARP packet validation. When DAI is enabled, it verifies that the sender MAC address and the source IP address are a valid pair in the DHCP snooping binding database and drops ARP packets whose sender MAC address and sender IP address do not match an entry in the database. Additional ARP packet validation can be configured.

If DHCP snooping is disabled on the ingress VLAN or the receive interface is trusted for DHCP snooping, ARP packets are dropped.

Functional Description

DAI is enabled on VLANs, effectively enabling DAI on the interfaces (physical ports or LAGs) that are members of that VLAN. Individual interfaces are configured as trusted or untrusted. The trust configuration for DAI is independent of the trust configuration for DHCP snooping. A trusted port is a port the network administrator does not consider to be a security threat. An untrusted port is one which could potentially be used to launch a network attack.

DAI considers all physical ports and LAGs untrusted by default.

Static Mappings

Static mappings are useful when hosts configure static IP addresses, DHCP snooping cannot be run, or other switches in the network do not run dynamic ARP inspection. A static mapping associates an IP address to a MAC address on a VLAN. DAI consults its static mappings before it consults DHCP snooping — thus, static mappings have precedence over DHCP snooping bindings.

ARP ACLs are used to define static mappings for DAI. In this implementation, only the subset of ARP ACL syntax required for DAI is supported. ARP ACLs are completely independent of ACLs used for QoS. A maximum of 100 ARP ACLs can be configured. Within an ACL, a maximum of 20 rules can be configured.

Optional ARP Packet Validation

If optional ARP packet validation has been configured, DAI verifies that the sender MAC address equals the source MAC address in the Ethernet header. Additionally, the option to verify that the target MAC address equals the destination MAC address in the Ethernet header can be configured. This check only applies to ARP responses, since the target MAC address is unspecified in ARP requests.

You can also enable IP address checking. When this option is enabled, DAI drops ARP packets with an invalid IP address. The following IP addresses are considered invalid:

- 0.0.0.0
- 255.255.255.255
- All IP multicast addresses
- All class E addresses (240.0.0.0/4)
- Loopback addresses (in the range 127.0.0.0/8)

Logging Invalid Packets

By default, DAI writes a log message to the normal buffered log for each invalid ARP packet it drops. You can configure DAI to not log invalid packets for specific VLANs.

Packet Forwarding

DAI forwards valid ARP packets whose destination MAC address is not local. The ingress VLAN could be a switching or routing VLAN. ARP requests are flooded in the VLAN. ARP responses are unicast toward their destination. DAI queries the MAC address table to determine the outgoing port. If the destination MAC address is local, DAI gives valid ARP packets to the ARP application.

Rate Limiting

To protect the switch from DHCP attacks when DAI is enabled, the DAI application enforces a rate limit for ARP packets received on untrusted interfaces. DAI monitors the receive rate on each interface separately. If the receive rate exceeds a configurable limit, DAI error disables the interface, which effectively brings down the interface. You can use the **set port enable** command to reenable the port.

You can configure both the rate and the burst interval. The default rate is 15 pps on each untrusted interface with a range of 0 to 100 pps. The default burst interval is 1 second with a range to 1 to 15 seconds.. The rate limit cannot be set on trusted interfaces since ARP packets received on trusted interfaces do not come to the CPU.

Eligible Interfaces

Dynamic ARP inspection is enabled per VLAN, effectively enabling DAI on the members of the VLAN, either physical ports or LAGs. Trust is specified on the VLAN members.

DAI cannot be enabled on port-based routing interfaces. It may be connected to:

- A single host through a trusted link (for example, a server)
- If multiple hosts need to connected, there must be a switch between the router and the hosts, with DAI enabled on that switch

Interaction with Other Functions

- DAI relies on the DHCP snooping application to verify that a {IP address, MAC address, VLAN, interface} tuple is valid.
- DAI registers with dot1q to receive notification of VLAN membership changes for the VLANs where DAI is enabled.
- DAI tells the driver about each untrusted interface (physical port or LAG) where DAI is enabled so that the hardware will intercept ARP packets and send them to the CPU.

Basic Configuration

The following basic configuration does not change the default rate limiting parameters.

Procedure 18-2 Basic Dynamic ARP Inspection Configuration

Step	Task	Command(s)
1.	Configure DHCP snooping.	Refer to Procedure 18-1 on page 18-3.
2.	Enable ARP inspection on the VLANs where clients are connected, and optionally, enable logging of invalid ARP packets.	**set arpinspection vlan** *vlan-range* [**logging**]
3.	Determine which ports are not security threats and configure them as DAI trusted ports.	**set arpinspection trust port** *port-string* **enable**
4.	If desired, configure optional validation parameters.	**set arpinspection validate** {[**src-mac**] [**dst-mac**] [**ip**]}
5.	If desired, configure static mappings for DAI by creating ARP ACLs: • Create the ARP ACL • Apply the ACL to a VLAN	**set arpinspection filter** *name* **permit ip host** *sender-ipaddr* **mac host** *sender-macaddr* **set arpinspection filter** *name* **vlan** *vlan-range* [**static**]

Example Configuration

Note: This example applies only to platforms that support routing.

The following example configures DHCP snooping and dynamic ARP inspection in a routing environment using RIP. The example configures two interfaces on the switch, configuring RIP on both interfaces, assigning each to a different VLAN, and then enabling DHCP snooping and dynamic ARP inspection on them:

- Interface ge.1.1, which is connected to a remote DHCP server, on VLAN 192
- Interface ge.1.2, which is connected to DHCP clients, on VLAN 10

In addition, the default VLAN, VLAN 1, is also enabled for DHCP snooping and dynamic ARP inspection.

Since the DHCP server is remote, the switch has been configured as a DHCP relay agent (with the **ip helper-address** command), to forward client requests to the DHCP server. Therefore, MAC address verification is disabled (with the **set dhcpsnooping verify mac-address disable** command) in order to allow DHCP RELEASE packets to be processed by the DHCP snooping functionality and client bindings removed from the bindings database

Router Configuration

```
router
enable
configure
interface vlan 10
no shutdown
ip address 10.2.0.1 255.255.0.0
ip helper-address 192.168.0.200
ip rip send version 2
ip rip receive version 2
ip rip enable
exit

interface vlan 192
no shutdown
ip address 192.168.0.1 255.255.255.0
ip rip send version 2
ip rip receive version 2
ip rip enable
exit
router rip
exit
```

VLAN Configuration

```
set vlan create 10
set vlan create 192
clear vlan egress 1 ge.1.1-2
```

```
set vlan egress 10 ge.1.2 untagged
set vlan egress 192 ge.1.1 untagged
```

DHCP Snooping Configuration

```
set dhcpsnooping enable
set dhcpsnooping vlan 1 enable
set dhcpsnooping vlan 10 enable
set dhcpsnooping vlan 192 enable
set dhcpsnooping verify mac-address disable
set dhcpsnooping trust port ge.1.1  enable
```

Dynamic ARP Inspection Configuration

```
set arpinspection vlan 1
set arpinspection vlan 10
set arpinspection vlan 192
set arpinspection trust port ge.1.1 enable
```

Dynamic ARP Inspection Commands

For information about...	Refer to page...
set arpinspection vlan	18-20
set arpinspection trust	18-21
set arpinspection validate	18-22
set arpinspection limit	18-23
set arpinspection filter	18-24
show arpinspection access-list	18-24
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clear arpinspection validate	18-27
clear arpinspection vlan	18-28
clear arpinspection filter	18-29
clear arpinspection limit	18-30
clear arpinspection statistics	18-31

set arpinspection vlan

Use this command to enable dynamic ARP inspection on one or more VLANs, and optionally, enable logging of invalid ARP packets.

Syntax

set arpinspection vlan *vlan-range* [**logging**]

Parameters

vlan-range	Specifies the VLAN or range of VLANs on which to enable dynamic ARP inspection.
logging	(Optional) Enables logging of invalid ARP packets for that VLAN.

Defaults

Logging is disabled by default.

Mode

Switch command, read-write.

Usage

This command enables dynamic ARP inspection (DAI) on one or more VLANs. When DAI is enabled on a VLAN, DAI is effectively enabled on the interfaces (physical ports or LAGs) that are members of that VLAN.

DAI uses the DHCP snooping bindings database to verify that the sender MAC address and the source IP address are a valid pair in the database. ARP packets whose sender MAC address and sender IP address do not match an entry in the database are dropped.

If logging is enabled, invalid ARP packets are also logged.

Example

This example enables DAI on VLANs 2 through 5 and also enables logging of invalid ARP packets on those VLANs.

```
B2(su)->set arpinspection vlan 2-5 logging
```

set arpinspection trust

Use this command to enable or disable a port as a dynamic ARP inspection trusted port.

Syntax

set arpinspection trust port *port-string* {**enable** | **disable**}

Parameters

port-string	Specifies the port or ports to be enabled or disabled as DAI trusted ports. The ports can be physical ports or LAGs that are members of a VLAN.
enable | **disable**	Enables or disables the specified ports as trusted for DAI.

Defaults

By default, all physical ports and LAGs are untrusted.

Mode

Switch command, read-write.

Usage

Individual interfaces are configured as trusted or untrusted. The trust configuration for DAI is independent of the trust configuration for DHCP snooping. A trusted port is a port the network administrator does not consider to be a security threat. An untrusted port is one which could potentially be used to launch a network attack.

DAI considers all physical ports and LAGs untrusted by default. Packets arriving on trusted interfaces bypass all DAI validation checks.

Example

This example enables port ge.1.1 as trusted for DAI.

```
B2(su)->set arpinspection trust port ge.1.1 enable
```

set arpinspection validate

Use this command to configure additional optional ARP validation parameters.

Syntax

`set arpinspection validate {[src-mac] [dst-mac] [ip]}`

Parameters

src-mac	Specifies that DAI should verify that the sender MAC address equals the source MAC address in the Ethernet header.
dst-mac	Specifies that DAI should verify that the target MAC address equals the destination MAC address in the Ethernet header. This check only applies to ARP responses, since the target MAC address is unspecified in ARP requests.
ip	Specifies that DAI should check the IP address and drop ARP packets with an invalid address. An invalid address is one of the following: • 0.0.0.0 • 255.255.255.255 • All IP multicast addresses • All class E addresses (240.0.0.0/4) • Loopback addresses (in the range 127.0.0.0/8)

Defaults

All parameters are optional, but at least one parameter must be specified.

Mode

Switch command, read-write.

Usage

This command adds additional validation of ARP packets by DAI, beyond the basic validation that the ARP packet's sender MAC address and sender IP address match an entry in the DHCP snooping bindings database.

Example

This example adds the optional verification that sender MAC addresses are the same as the source MAC addresses in the Ethernet headers of ARP packets.

```
B2(su)->set arpinspection validate src-mac
```

set arpinspection limit

Use this command to configure rate limiting parameters for incoming ARP packets on a port or ports

Syntax

set arpinspection limit port *port-string* {**none** | **rate** *pps* {**burst interval** *secs*]}

Parameters

port-string	Specifies the port or ports to which to apply these rate limiting parameters.
none	Configures no limit on incoming ARP packets.
rate *pps*	Specifies a rate limit in packets per second. The value of *pps* can range from 0 to 100 packets per second.
burst interval *secs*	Specifies a burst interval in seconds. The value of *secs* can range from 1 to 15 seconds.

Defaults

Rate = 15 packets per second

Burst Interval = 1 second

Mode

Switch command, read-write.

Usage

To protect the switch against DHCP attacks when DAI is enabled, the DAI application enforces a rate limit for ARP packets received on untrusted interfaces. DAI monitors the receive rate on each interface separately. If the receive rate exceeds the limit configured with this command, DAI disables the interface, which effectively brings down the interface. You can use the **set port enable** command to reenable the port.

You can configure both the rate and the burst interval. The default rate is 15 pps on each untrusted interface with a range of 0 to 100 pps. The default burst interval is 1 second with a range to 1 to 15 seconds.. The rate limit cannot be set on trusted interfaces since ARP packets received on trusted interfaces do not come to the CPU.

Example

This example sets the rate to 20 packets per second and the burst interval to 2 seconds on ports ge.1.1 and ge.1.2.

```
B2(su)->set arpinspection limit port ge.1.1-2 rate 20 burst interval 2
```

set arpinspection filter

Use this command to create an ARP ACL and then to assign an ACL to a VLAN, optionally as a static mapping.

Syntax

set arpinspection filter *name* {**permit ip host** *sender-ipaddr* **mac host** *sender-macaddr* | **vlan** *vlan-range* [**static**]}

Parameters

name	Specifies the name of the ARP ACL.
permit	Specifies that a permit rule is being created.
ip host *sender-ipaddr*	Specifies the IP address in the rule being created.
mac host *sender-macaddr*	Specifies the MAC address in the rule being created.
vlan *vlan-range*	Specifies the VLAN or VLANs to which this ARP ACL is assigned.
static	(Optional) Specifies that this ARP ACL configures static mappings for the VLAN or VLANs.

Defaults

None.

Mode

Switch command, read-write.

Usage

ARP ACLs are used to define static mappings for DAI. ARP ACLs are completely independent of ACLs used for QoS. A maximum of 100 ARP ACLs can be configured. Within an ACL, a maximum of 20 rules can be configured.

A static mapping associates an IP address to a MAC address on a VLAN. DAI consults its static mappings before it consults the DHCP snooping bindings database — thus, static mappings have precedence over DHCP snooping bindings.

Example

This example creates an ACL named staticARP and creates a permit rule for IP address 192.168.1.10. Then, the ACL is assigned to a VLAN as a static mapping.

```
B2(su)->set arpinspection filter staticARP permit ip host 192.168.1.10 mac host
00:01:22:33:44:55
B2(su)->set arpinspection filter staticARP vlan 10 static
```

show arpinspection access-list

Use this command to display ARP access list configuration information.

Syntax

show arpinspection access-list [*acl-name*]

Parameters

acl-name	(Optional) Specifies the ARP ACL to display.

Defaults

If a specific ACL is not specified, information about all configured ARP ACLs is displayed.

Mode

Switch command, read-write.

Example

This example displays information about the ARP ACL named staticARP.

```
B2(su)->show arpinspection access-list staticARP
ARP access list   staticARP
    permit ip host 192.168.1.10 mac host 00:01:22:33:44:55
    permit ip host 192.168.1.20 mac host 00:0A:11:22:33:66
```

show arpinspection ports

Use this command to display the ARP configuration of one or more ports.

Syntax

show arpinspection ports [*port-string*]

Parameters

port-string	(Optional) Specifies the port or ports for which to display ARP configuration information.

Defaults

If a port-string is not specified, information about all DAI-enabled untrusted ports is displayed.

Mode

Switch command, read-write.

Example

This example displays the ARP configuration of lag.0.1.

```
B2(su)->show arpinspection ports lag.0.1
Interface     Trust State     Rate Limit      Burst Interval
                                 (pps)          (seconds)
----------   -------------   -------------   ---------------
   lag.0.1              No              15                 1
```

show arpinspection vlan

Use this command to display the ARP configuration of one or more VLANs.

Syntax

show arpinspection vlan *vlan-range*

Parameters

vlan-range	Specifies the VLANs for which to display configuration information.

Defaults

None.

Mode

Switch command, read-write.

Example

This example displays ARP configuration information for VLAN 5.

```
B2(su)->show arpinspection vlan 5
Source MAC Validation                          Disabled
Destination MAC Validation                     Disabled
IP Address Validation                          Disabled

Vlan  Configuration Log Invalid           ACL Name                Static flag
----  ------------- ----------- -------------------------------  -----------
   5       Disabled     Enabled                         staticARP     Enabled
```

show arpinspection statistics

Use this command to display ARP statistics for all DAI-enabled VLANs or for specific VLANs.

Syntax

show arpinspection statistics [**vlan** *vlan-range*]

Parameters

vlan *vlan-range*	(Optional) Specifies the VLANs for which to display statistics.

Defaults

If no VLANs are specified, limited statistics for all DAI-enabled VLANs is displayed.

Mode

Switch command, read-write.

Usage

When no specific VLANs are entered, this command displays the number of Forwarded and Dropped ARP packets per DAI-enabled VLAN. When one or more VLANs are specified, this command displays more detailed statistics.

Examples

This example shows what is displayed when no VLANs are specified.

```
B2(su)->show arpinspection statistics
VLAN    Forwarded     Dropped
----   ------------  ---------
   5              0          0
```

This example shows what information is displayed when one or more VLANs are specified.

```
B2(su)->show arpinspection statistics vlan 5
VLAN    DHCP       ACL        DHCP       ACL        Bad Src   Bad Dest   Invalid
        Drops      Drops     Permits    Permits       MAC       MAC       IP
---- ---------- ---------- ---------- ---------- ---------- ---------- ---------
   5          0          0          0          0          0          0         0
```

clear arpinspection validate

Use this command to remove additional optional ARP validation parameters that were previously configured.

Syntax

clear arpinspection validate {[**src-mac**] [**dst-mac**] [**ip**]}

Parameters

src-mac	Clear, or remove, the verification that the sender MAC address equals the source MAC address in the Ethernet header.
dst-mac	Clear, or remove, the verification that the target MAC address equals the destination MAC address in the Ethernet header.
ip	Clear, or remove, checking the IP address and dropping ARP packets with an invalid address.

Defaults

All parameters are optional, but at least one parameter must be specified.

Mode

Switch command, read-write.

Usage

This command removes previously configured additional validation of ARP packets by DAI, beyond the basic validation that the ARP packet's sender MAC address and sender IP address match an entry in the DHCP snooping bindings database.

Use the **show arpinspection vlan** command to display the current status of the additional validation rules.

Example

This example removes all 3 additional validation conditions.

```
B2(su)->clear arpinspection validate src-mac dst-mac ip
```

clear arpinspection vlan

Use this command to disable dynamic ARP inspection on one or more VLANs or to disable logging of invalid ARP packets on one or more VLANs.

Syntax

clear arpinspection vlan *vlan-range* [**logging**]

Parameters

vlan-range	Specifies the VLAN or range of VLANs on which to disable dynamic ARP inspection.
logging	(Optional) Disable logging of invalid ARP packets for the specified VLANs.

Defaults

If logging is enabled for the specified VLAN but **logging** is not entered with this command, logging will remain enabled.

Mode

Switch command, read-write.

Usage

You can use this command to disable dynamic ARP inspection on one or more VLANs, or you can disable logging of invalid ARP packets on specified VLANs. To disable both logging and DAI, you must enter this command twice.

Example

This example first displays the DAI configuration for VLAN 5, then disables DAI on VLAN 5, then disables logging of invalid ARP packets on VLAN 5.

```
B2(su)->show arpinspection vlan 5

Source MAC Validation                          Disabled
Destination MAC Validation                     Disabled
IP Address Validation                          Disabled

Vlan  Configuration Log Invalid           ACL Name                Static flag
----  ------------- ----------- --------------------------------  -----------
   5        Enabled     Enabled                         staticARP     Enabled


B2(su)->clear arpinspection vlan 5


B2(su)->show arpinspection vlan 5

Source MAC Validation                          Disabled
Destination MAC Validation                     Disabled
IP Address Validation                          Disabled

Vlan  Configuration Log Invalid           ACL Name                Static flag
----  ------------- ----------- --------------------------------  -----------
   5       Disabled     Enabled                         staticARP     Enabled
```

```
B2(su)->clear arpinspection vlan 5 logging
B2(su)->show arpinspection vlan 5
Source MAC Validation                          Disabled
Destination MAC Validation                     Disabled
IP Address Validation                          Disabled

Vlan  Configuration Log Invalid          ACL Name                Static flag
----  ------------- ----------- -------------------------------  -----------
   5       Disabled    Disabled                        staticARP     Enabled
```

clear arpinspection filter

Use this command to remove an ARP ACL from a VLAN or from the switch, or to remove a permit rule from an existing ACL, or to change the status of static mapping to disabled.

Syntax

clear arpinspection filter *name* [**permit ip host** *sender-ipaddr* **mac host** *sender-macaddr*] | [**vlan** *vlan-range* [**static**]

Parameters

name	Specifies the name of the ARP ACL.
permit	(Optional) Specifies that a permit rule is being deleted.
ip host *sender-ipaddr*	Specifies the IP address in the rule being deleted.
mac host *sender-macaddr*	Specifies the MAC address in the rule being deleted.
vlan *vlan-range*	(Optional) Specifies the VLAN or VLANs to which this command should apply. Remove the ACL from the VLAN, if **static** is not specified also.
static	(Optional) Specifies that static mapping should be disabled for this ARP ACL for the specified VLAN or VLANs.

Defaults

If only the name is specified, the ACL is deleted from the switch.

Mode

Switch command, read-write.

Usage

You can use this command to:

- Remove a configured ARP ACL from the switch, or
- Remove a permit rule from a configured ARP ACL, or
- Remove the association of an ARP ACL with a VLAN or VLANs, or
- Disable static mapping of an ARP ACL associated with a VLAN or VLANs.

Use the **set arpinspection filter** command to create and assign an ARP ACL.

Use the **show arpinspection access-list** command to display currently configured ARP ACLs.

Examples

This example removes a permit rule from the ARP ACL named staticARP.

```
B2(su)->clear arpinspection filter staticARP permit ip host 192.168.1.10 mac host
00:01:22:33:44:55
```

This example disables static mapping of the ARP ACL named staticARP that is associated with VLAN 5.

```
B2(su)->clear arpinspection filter staticARP vlan 5 static
```

This example removes the ARP ACL named staticARP from VLAN 5.

```
B2(su)->clear arpinspection filter staticARP vlan 5
```

This example removes the ARP ACL named staticARP from the switch completely.

```
B2(su)->clear arpinspection filter staticARP
```

clear arpinspection limit

Use this command to return the DAI rate limiting values to their default values for a port or range of ports.

Syntax

clear arpinspection limit port *port-string*

Parameters

port-string	Specifies the ports on which to return the rate limiting values to defaults.

Defaults

Rate = 15 packets per second

Burst Interval = 1 second

Mode

Switch mode, read-write.

Usage

Use the **set arpinspection limit** command to change the values of the rate limit and burst interval.

Use the **show arpinspection ports** command to display the currently configured rate limits.

Example

This example returns the DAI rate limiting values to their defaults for port ge.1.1.

```
B2(su)->clear arpinspection limit port ge.1.1
```

clear arpinspection statistics

Use this command to clear all dynamic ARP inspection statistics.

Syntax

```
clear arpinspection statistics
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example clears all DAI statistics from the switch.

```
B2(su)->clear arpinspection statistics
```

19

Authentication and Authorization Configuration

This chapter describes the authentication and authorization commands and how to use them.

For information about...	Refer to page...
Overview of Authentication and Authorization Methods	19-1
Configuring RADIUS	19-3
Configuring 802.1X Authentication	19-11
Configuring MAC Authentication	19-21
Configuring Multiple Authentication Methods	19-33
Configuring VLAN Authorization (RFC 3580)	19-45
Configuring MAC Locking	19-50
Configuring Port Web Authentication (PWA)	19-61
Configuring Secure Shell (SSH)	19-73

Overview of Authentication and Authorization Methods

The following methods are available for controlling which users are allowed to access, monitor, and manage the switch.

- Login user accounts and passwords – used to log in to the CLI via a Telnet connection or local COM port connection. For details, refer to "Setting User Accounts and Passwords" on page 3-2.
- Host Access Control Authentication (HACA) – authenticates user access of Telnet management, console local management and WebView via a central RADIUS Client/Server application. When RADIUS is enabled, this essentially overrides login user accounts. When HACA is active per a valid RADIUS configuration, the user names and passwords used to access the switch via Telnet, SSH, WebView, and COM ports will be validated against the configured RADIUS server. Only in the case of a RADIUS timeout will those credentials be compared against credentials locally configured on the switch. For details, refer to "Configuring RADIUS" on page 19-3.
- SNMP user or community names – allows access to the SecureStack B2 switch via a network SNMP management application. To access the switch, you must enter an SNMP user or community name string. The level of management access is dependent on the associated access policy. For details, refer to Chapter 8.

- 802.1X Port Based Network Access Control using EAPOL (Extensible Authentication Protocol) – provides a mechanism via a RADIUS server for administrators to securely authenticate and grant appropriate access to end user devices communicating with SecureStack B2 ports. For details on using CLI commands to configure 802.1X, refer to "Configuring 802.1X Authentication" on page 19-11.

Note: To configure EAP pass-through, which allows client authentication packets to be forwarded through the switch to an upstream device, 802.1X authentication must be globally disabled with the **set dot1x** command.

- MAC Authentication – provides a mechanism for administrators to securely authenticate source MAC addresses and grant appropriate access to end user devices communicating with SecureStack B2 ports. For details, refer to "Configuring MAC Authentication" on page 19-21.
- Multiple Authentication Methods – allows users to authenticate using multiple methods of authentication on the same port. For details, refer to "Configuring Multiple Authentication Methods" on page 19-33.
- Multi-User Authentication – User + IP Phone. The User + IP Phone authentication feature supports authentication and authorization of two devices, specifically a PC cascaded with an IP phone, on a single port on the B2. The IP phone must authenticate using MAC or 802.1X authentication, but the user may authenticate by any method. This feature allows both the user's PC and IP phone to simultaneously authenticate on a single port and each receive a unique level of network access. For details, refer to "Configuring Multi-User Authentication (User + IP phone)" on page 19-33.
- RFC 3580 Tunnel Attributes provide a mechanism to contain an 802.1X authenticated or MAC authenticated user to a VLAN regardless of the PVID. Up to three users can be configured per Gigabit port. Refer to "Configuring VLAN Authorization (RFC 3580)" on page 19-45.

Notes: The B2 supports up to three authenticated users per port.

The B2 cannot simultaneously support Policy and RFC 3580 on the same port. If multiple users are configured to use a port, and the B2 is then switched from "policy" mode to "tunnel" mode (RFC-3580 VLAN to port mapping), the total number of users supported to use a port will be reset to one.

RFC-3580 VLAN authorization is not supported by PWA authentication.

- MAC Locking – locks a port to one or more MAC addresses, preventing the use of unauthorized devices and MAC spoofing on the port For details, refer to "Configuring MAC Locking" on page 19-50.
- Port Web Authentication (PWA) – passes all login information from the end station to a RADIUS server for authentication before allowing a user to access the network . PWA is an alternative to 802.1X and MAC authentication. For details, refer to "Configuring Port Web Authentication (PWA)" on page 19-61.
- Secure Shell (SSH) – provides secure Telnet. For details, refer to "Configuring Secure Shell (SSH)" on page 19-73.

RADIUS Filter-ID Attribute and Dynamic Policy Profile Assignment

If you configure an authentication method that requires communication with a RADIUS server, you can use the RADIUS Filter-ID attribute to dynamically assign a policy profile and/or management level to authenticating users and/or devices.

The RADIUS Filter-ID attribute is simply a string that is formatted in the RADIUS Access-Accept packet sent back from the RADIUS server to the switch during the authentication process.

Each user can be configured in the RADIUS server database with a RADIUS Filter-ID attribute that specifies the name of the policy profile and/or management level the user should be assigned upon successful authentication. During the authentication process, when the RADIUS server returns a RADIUS Access-Accept message that includes a Filter-ID matching a policy profile name configured on the switch, the switch then dynamically applies the policy profile to the physical port the user/device is authenticating on.

Filter-ID Attribute Formats

Enterasys Networks supports two Filter-ID formats — "decorated" and "undecorated." The decorated format has three forms:

- To specify the policy profile to assign to the authenticating user (network access authentication):

  Enterasys:version=1:policy=*string*

  where *string* specifies the policy profile name. Policy profile names are case-sensitive.

- To specify a management level (management access authentication):

  Enterasys:version=1:mgmt=*level*

  where *level* indicates the management level, either **ro**, **rw**, or **su**.

- To specify both management level and policy profile:

  Enterasys:version=1:mgmt=*level*:policy=*string*

The undecorated format is simply a string that specifies a policy profile name. The undecorated format cannot be used for management access authentication.

Decorated Filter-IDs are processed first by the switch. If no decorated Filter-IDs are found, then undecorated Filter-IDs are processed. If multiple Filter-IDs are found that contain conflicting values, a Syslog message is generated.

Configuring RADIUS

Purpose

To perform the following:

- Review the RADIUS client/server configuration on the switch.
- Enable or disable the RADIUS client.
- Set local and remote login options.
- Set primary and secondary server parameters, including IP address, timeout period, authentication realm, and number of user login attempts allowed.
- Reset RADIUS server settings to default values.
- Configure a RADIUS accounting server.

Commands

For information about...	Refer to page...
show radius	19-4
set radius	19-5
clear radius	19-7
show radius accounting	19-7
set radius accounting	19-8
clear radius accounting	19-9

show radius

Use this command to display the current RADIUS client/server configuration.

Syntax

show radius [**status** | **retries** | **timeout** | **server** [*index* **| all**]]

Parameters

status	(Optional) Displays the RADIUS server's enable status.
retries	(Optional) Displays the number of retry attempts before the RADIUS server times out.
timeout	(Optional) Displays the maximum amount of time (in seconds) to establish contact with the RADIUS server before retry attempts begin.
server	(Optional) Displays RADIUS server configuration information.
index | **all**	For use with the **server** parameter to show server configuration for all servers or a specific RADIUS server as defined by an index.

Defaults

If no parameters are specified, all RADIUS configuration information will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display RADIUS configuration information:

```
B2(rw)->show radius
 RADIUS status:    Enabled
 RADIUS retries:   3
 RADIUS timeout:   20 seconds
 RADIUS Server     IP Address      Auth-Port  Realm-Type
 --------------    ----------      ---------  -----------------
 10                172.16.20.10      1812     management-access
```

Table 19-1 provides an explanation of the command output.

Table 19-1 show radius Output Details

Output Field	What It Displays...
RADIUS status	Whether RADIUS is **enabled** or **disabled**.
RADIUS retries	Number of retry attempts before the RADIUS server times out. The default value of **3** can be reset using the **set radius** command as described in "set radius" on page 19-5.
RADIUS timeout	Maximum amount of time (in seconds) to establish contact with the RADIUS server before retry attempts begin. The default value of **20** can be reset using the **set radius** command as described in "set radius" on page 19-5.
RADIUS Server	RADIUS server's index number, IP address, and UDP authentication port.
Realm-Type	Realm defines who has to go through the RADIUS server for authentication. • Management-access: This means that anyone trying to access the switch (Telnet, SSH, Local Management) has to authenticate through the RADIUS server. • Network-access: This means that all the users have to authenticate to a RADIUS server before they are allowed access to the network. • Any-access: Means that both Management-access and Network-access have been enabled.

set radius

Use this command to enable, disable, or configure RADIUS authentication.

Syntax

set radius {**enable** | **disable**} | {**retries** *number-of-retries*} | {**timeout** *timeout*} | {**server** *index ip-address port* [*secret-value*] [**realm** {**management-access** | **any** | **network-access**}} | {**realm** {**management-access** | **any** | **network-access**} {*index*| **all**}}

Parameters

enable | **disable**	Enables or disables the RADIUS client.
retries *number-of-retries*	Specifies the number of retry attempts before the RADIUS server times out. Valid values are from **0** to **10**. Default is **3**.
timeout *timeout*	Specifies the maximum amount of time (in seconds) to establish contact with the RADIUS server before retry attempts begin. Valid values are from **1** to **30**. Default is **20** seconds.
server *index ip_address port*	Specifies the index number, IP address and the UDP authentication port for the RADIUS server.
secret-value	(Optional) Specifies an encryption key to be used for authentication between the RADIUS client and server.

realm management-access | **any** | **network-access**	Realm allows you to define who has to go through the RADIUS server for authentication. • **management-access**: This means that anyone trying to access the switch (Telnet, SSH, Local Management) has to authenticate through the RADIUS server. • **network-access**: This means that all the users have to authenticate to a RADIUS server before they are allowed access to the network. • **any**: Means that both management-access and network-access have been enabled. **Note:** If the **management-access** or **any** access realm has been configured, the local "admin" account is disabled for access to the switch using the console, Telnet, or Local Management. Only the **network-access** realm allows access to the local "admin" account.
index | **all**	Applies the realm setting to a specific server or to all servers.

Defaults

If *secret-value* is not specified, none will be applied.

If **realm** is not specified, the **any** access realm will be used.

Mode

Switch command, read-write.

Usage

The SecureStack B2 device allows up to 10 RADIUS accounting servers to be configured, with up to two servers active at any given time.

The RADIUS client can only be enabled on the switch once a RADIUS server is online, and its IP address(es) has been configured with the same password the RADIUS client will use.

Note: If RADIUS is configured with no host IP address on the device, it will use the loopback interface 0 IP address (if it has been configured) as its source for the NAS-IP attribute. For information about configuring loopback interfaces, refer to "interface" on page 20-2.

Examples

This example shows how to enable the RADIUS client for authenticating with RADIUS server 1 at IP address 192.168.6.203, UDP authentication port 1812, and an authentication password of "pwsecret." As previously noted, the "server secret" password entered here must match that already configured as the Read-Write (rw) password on the RADIUS server:

```
B2(su)->set radius server 1 192.168.6.203 1812 pwsecret
```

This example shows how to set the RADIUS timeout to 5 seconds:

```
B2(su)->set radius timeout 5
```

This example shows how to set RADIUS retries to 10:

```
B2(su)->set radius retries 10
```

This example shows how to force any management-access to the switch (Telnet, web, SSH) to authenticate through a RADIUS server. The **all** parameter at the end of the command means that any of the defined RADIUS servers can be used for this Authentication.

```
B2(rw)->set radius realm management-access all
```

clear radius

Use this command to clear RADIUS server settings.

Syntax

clear radius [**retries**] | [**timeout**] | [**server** {*index* | **all** | **realm** {*index* | **all**}}]

Parameters

retries	Resets the maximum number of attempts a user can contact the RADIUS server before timing out to **3**.
timeout	Resets the maximum amount of time to establish contact with the RADIUS server before timing out to **20** seconds.
server	Deletes server settings.
index | **all**	For use with the **server** parameter to clear the server configuration for all servers or a specific RADIUS server as defined by an index.
realm	Resets the realm setting for all servers or a specific RADIUS server as defined by an index.

Mode

Switch command, read-write.

Defaults

None.

Examples

This example shows how to clear all settings on all RADIUS servers:

```
B2(su)->clear radius server all
```

This example shows how to reset the RADIUS timeout to the default value of 20 seconds:

```
B2(su)->clear radius timeout
```

show radius accounting

Use this command to display the RADIUS accounting configuration. This transmits accounting information between a network access server and a shared accounting server.

Syntax

show radius accounting [**server**] | [**counter** *ip-address*] | [**retries**] | [**timeout**]

Parameters

server	(Optional) Displays one or all RADIUS accounting server configurations.
counter *ip-address*	(Optional) Displays counters for a RADIUS accounting server.
retries	(Optional) Displays the maximum number of attempts to contact the RADIUS accounting server before timing out.
timeout	(Optional) Displays the maximum amount of time before timing out.

Mode

Switch command, read-only.

Defaults

If no parameters are specified, all RADIUS accounting configuration information will be displayed.

Example

This example shows how to display RADIUS accounting configuration information. In this case, RADIUS accounting is not currently enabled and global default settings have not been changed. One server has been configured.

For details on enabling and configuring RADIUS accounting, refer to "set radius accounting" on page 19-8:

```
B2(ro)->show radius accounting

RADIUS accounting status:      Disabled
 RADIUS Acct Server  IP Address  Acct-Port Retries Timeout Status
 ------------------  ----------  --------- ------- ------- ------
 1                   172.16.2.10  1856      3       20      Disabled
```

set radius accounting

Use this command to configure RADIUS accounting.

Syntax

set radius accounting {[**enable** | **disable**] [**retries** *retries*] [**timeout** *timeout*] [**server** *ip_address port* [*server-secret*]

Parameters

enable | **disable**	Enables or disables the RADIUS accounting client.
retries *retries*	Sets the maximum number of attempts to contact a specified RADIUS accounting server before timing out. Valid retry values are **0** - **10**.

timeout *timeout*	Sets the maximum amount of time (in seconds) to establish contact with a specified RADIUS accounting server before timing out. Valid timeout values are **1** - **30**.
server *ip_address port server-secret*	Specifies the accounting server's: • IP address • UDP authentication port (**0** - **65535)** • *server-secret* (Read-Write password to access this accounting server. Device will prompt for this entry upon creating a server instance, as shown in the example below.)

Mode

Switch command, read-write.

Defaults

None.

Examples

This example shows how to enable the RADIUS accounting client for authenticating with the accounting server at IP address 10.2.4.12, UDP authentication port 1800. As previously noted, the "server secret" password entered here must match that already configured as the Read-Write (rw) password on the RADIUS accounting server:

```
B2(su)->set radius accounting server 10.2.4.12 1800
Enter secret:
Re-enter secret:
```

This example shows how to set the RADIUS accounting timeout to 30 seconds:

```
B2(su)->set radius accounting timeout 30
```

This example shows how to set RADIUS accounting retries to 10:

```
B2(su)->set radius accounting retries 10
```

clear radius accounting

Use this command to clear RADIUS accounting configuration settings.

Syntax

clear radius accounting {**server** *ip-address* | **retries** | **timeout** | **counter**}

Parameters

server *ip-address*	Clears the configuration on one or more accounting servers.
retries	Resets the retries to the default value of 3.
timeout	Resets the timeout to 5 seconds.
counter	Clears counters.

Mode

Switch command, read-write.

Defaults

None.

Example

This example shows how to reset the RADIUS accounting timeout to 5 seconds.

```
B2(su)->clear radius accounting timeout
```

Configuring 802.1X Authentication

Purpose

To review and configure 802.1X authentication for one or more ports using EAPOL (Extensible Authentication Protocol). 802.1X controls network access by enforcing user authorization on selected ports, which results in allowing or denying network access according to RADIUS server configuration.

Note: To configure EAP pass-through, which allows client authentication packets to be forwarded through the switch to an upstream device, 802.1X authentication must be globally disabled with the **set dot1x** command ("set dot1x" on page 19-14).

Commands

For information about...	Refer to page...
show dot1x	19-11
show dot1x auth-config	19-13
set dot1x	19-14
set dot1x auth-config	19-15
clear dot1x auth-config	19-16
show eapol	19-17
set eapol	19-19
clear eapol	19-19

show dot1x

Use this command to display 802.1X status, diagnostics, statistics, and reauthentication or initialization control information for one or more ports.

Syntax

`show dot1x` [**`auth-diag`**] [**`auth-stats`**] [**`port`** [**`init`** | **`reauth`**]] [*`port-string`*]

Parameters

auth-diag	(Optional) Displays authentication diagnostics information.
auth-stats	(Optional) Displays authentication statistics.
port init | **reauth**	(Optional) Displays the status of port initialization and reauthentication control for the port.
port-string	(Optional) Displays information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If no parameters are specified, 802.1X status will be displayed.

If *port-string* is not specified, information for all ports will be displayed.

Mode

Switch command, read-only.

Examples

This example shows how to display 802.1X status:

```
B2(su)->show dot1x
DOT1X is disabled.
```

This example shows how to display authentication diagnostics information for fe.1.1:

```
B2(su)->show dot1x auth-diag fe.1.1

Port : 1   Auth-Diag
Enter Connecting:                       0
EAP Logoffs While Connecting:           0
Enter Authenticating:                   0
Success While Authenticating            0
Timeouts While Authenticating:          0
Fails While Authenticating:             0
ReAuths While Authenticating:           0
EAP Starts While Authenticating:        0
EAP logoff While Authenticating:        0
Backend Responses:                      0
Backend Access Challenges:              0
Backend Others Requests To Supp:        0
Backend NonNak Responses From:          0
Backend Auth Successes:                 0
Backend Auth Fails:                     0
```

This example shows how to display authentication statistics for fe.1.1:

```
B2(su)->show dot1x auth-stats fe.1.1
Port: 1   Auth-Stats
EAPOL Frames Rx:              0
EAPOL Frames Tx:              0
EAPOL Start Frames Rx:        0
EAPOL Logoff Frames Rx:       0
EAPOL RespId Frames Rx:       0
EAPOL Resp Frames Rx:         0
EAPOL Req Frames Tx:          0
EAP Length Error Frames Rx:   0
Last EAPOL Frame Version:     0
Last EAPOL Frame Source:      00:00:00:00:00:00
```

This example shows how to display the status of port reauthentication control for fe.1.1 through fe.1.6:

```
B2(su)->show dot1x port reauth fe.1.1-6
 Port 1: Port reauthenticate:     FALSE
 Port 2: Port reauthenticate:     FALSE
 Port 3: Port reauthenticate:     FALSE
 Port 4: Port reauthenticate:     FALSE
 Port 5: Port reauthenticate:     FALSE
 Port 6: Port reauthenticate:     FALSE
```

show dot1x auth-config

Use this command to display 802.1X authentication configuration settings for one or more ports.

Syntax

```
show dot1x auth-config [authcontrolled-portcontrol] [maxreq] [quietperiod]
[reauthenabled] [reauthperiod] [servertimeout] [supptimeout] [txperiod]
[port-string]
```

Parameters

authcontrolled-portcontrol	(Optional) Displays the current value of the controlled Port control parameter for the port.
maxreq	(Optional) Displays the value set for maximum requests currently in use by the backend authentication state machine.
quietperiod	(Optional) Displays the value set for quiet period currently in use by the authenticator PAE state machine.
reauthenabled	(Optional) Displays the state of reauthentication control used by the Reauthentication Timer state machine.
reauthperiod	(Optional) Displays the value, in seconds, set for the reauthentication period used by the reauthentication timer state machine.
servertimeout	(Optional) Displays the server timeout value, in seconds, currently in use by the backend authentication state machine.
supptimeout	(Optional) Displays the authentication supplicant timeout value, in seconds, currently in use by the backend authentication state machine.
txperiod	(Optional) Displays the transmission period value, in seconds, currently in use by the authenticator PAE state machine.
port-string	(Optional) Limits the display of desired information information to specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If no parameters are specified, all 802.1X settings will be displayed.

If *port-string* is not specified, information for all ports will be displayed.

Mode

Switch command, read-only.

Examples

This example shows how to display the EAPOL port control mode for fe.1.1:

```
B2(su)->show dot1x auth-config authcontrolled-portcontrol fe.1.1
Port 1: Auth controlled port control:             Auto
```

This example shows how to display the 802.1X quiet period settings for fe.1.1:

```
B2(su)->show dot1x auth-config quietperiod fe.1.1
 Port 1: Quiet period:         30
```

This example shows how to display all 802.1X authentication configuration settings for ge.1.1:

```
B2(ro)->show dot1x auth-config ge.1.1
```

```
Port : 1    Auth-Config
 PAE state:                              Initialize
 Backend auth state:                     Initialize
 Admin controlled directions:            Both
 Oper controlled directions:             Both
 Auth controlled port status:            Authorized
 Auth controlled port control:           Auto
 Quiet period:                  60
 Transmission period:           30
 Supplicant timeout:            30
 Server timeout:                30
 Maximum requests:              2
 Reauthentication period:       3600
 Reauthentication control:      Disabled
```

set dot1x

Use this command to enable or disable 802.1X authentication, to reauthenticate one or more access entities, or to reinitialize one or more supplicants.

Syntax

set dot1x {**enable** | **disable** | **port** {**init** | **reauth**} {**true** | **false**} [*port-string*]*}*

Parameters

enable | **disable**	Enables or disables 802.1X.
port	Enable or disable 802.1X reauthentication or initialization control on one or more ports.
init | **reauth**	Configure initialization or reauthentication control.
true | **false**	Enable (true) or disable (false) reinitialization/reauthentication.
port-string	(Optional) Specifies the port(s) to reinitialize or reauthenticate.

Defaults

If no ports are specified, the reinitialization or reauthentication setting will be applied to all ports.

Mode

Switch command, read-write.

Usage

Disabling 802.1X authentication globally, by not entering a specific *port-string* value, will enable the EAP pass-through feature. EAP pass-through allows client authentication packets to be forwarded unmodified through the switch to an upstream device.

Examples

This example shows how to enable 802.1X:

```
B2(su)->set dot1x enable
```

This example shows how to reinitialize ge.1.2:

```
B2(rw)->set dot1x port init true ge.1.2
```

set dot1x auth-config

Use this command to configure 802.1X authentication.

Syntax

```
set dot1x auth-config {[authcontrolled-portcontrol {auto | forced-auth |
forced-unauth}] [maxreq value] [quietperiod value] [reauthenabled {false | true}]
[reauthperiod value] [servertimeout timeout] [supptimeout timeout] [txperiod
value]} [port-string]
```

Parameters

authcontrolled-portcontrol auto | **forced-auth** | **forced-unauth**	Specifies the 802.1X port control mode. • **auto** – Set port control mode to auto controlled port control. This is the default value. • **forced-auth –** Set port control mode to ForcedAuthorized controlled port control. • **forced-unauth –** Set port control mode to ForcedUnauthorized controlled port control.
maxreq *value*	Specifies the maximum number of authentication requests allowed by the backend authentication state machine. Valid values are **1 – 10**. Default value is 2.
quietperiod *value*	Specifies the time (in seconds) following a failed authentication before another attempt can be made by the authenticator PAE state machine. Valid values are **0 – 65535**. Default value is 60 seconds.
reauthenabled false | **true**	Enables (**true**) or disables (**false**) reauthentication control of the reauthentication timer state machine. Default value is false.
reauthperiod *value*	Specifies the time lapse (in seconds) between attempts by the reauthentication timer state machine to reauthenticate a port. Valid values are **0 – 65535**. Default value is 3600 seconds.
servertimeout *timeout*	Specifies a timeout period (in seconds) for the authentication server, used by the backend authentication state machine. Valid values are **1 – 300**. Default value is 30 seconds.
supptimeout *timeout*	Specifies a timeout period (in seconds) for the authentication supplicant used by the backend authentication state machine. Valid values are **1 – 300**. Default value is 30 seconds.
txperiod *value*	Specifies the period (in seconds) which passes between authenticator PAE state machine EAP transmissions. Valid values are **0 – 65535**. Default value is 30 seconds.
port-string	(Optional) Limits the configuration of desired settings to specified port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, authentication parameters will be set on all ports.

Mode

Switch command, read-write.

Examples

This example shows how to enable reauthentication control on ports fe.1.1-3:

```
B2(su)->set dot1x auth-config reauthenabled true fe.1.1-3
```

This example shows how to set the 802.1X quiet period to 120 seconds on ports fe.1.1-3:

```
B2(su)->set dot1x auth-config quietperiod 120 fe.1.1-3
```

clear dot1x auth-config

Use this command to reset 802.1X authentication parameters to default values on one or more ports.

Syntax

clear dot1x auth-config [**authcontrolled-portcontrol**] [**maxreq**] [**quietperiod**] [**reauthenabled**] [**reauthperiod**] [**servertimeout**] [**supptimeout**] [**txperiod**] [*port-string*]

Parameters

authcontrolled-portcontrol	(Optional) Resets the 802.1X port control mode to **auto**.
maxreq	(Optional) Resets the maximum requests value to **2**.
quietperiod	(Optional) Resets the quiet period value to **60** seconds.
reauthenabled	(Optional) Resets the reauthentication control state to disabled (**false**).
reauthperiod	(Optional) Resets the reauthentication period value to **3600** seconds.
servertimeout	(Optional) Resets the server timeout value to **30** seconds.
supptimeout	(Optional) Resets the authentication supplicant timeout value to **30** seconds.
txperiod	(Optional) Resets the transmission period value to **30** seconds.
port-string	(Optional) Resets settings on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If no parameters are specified, all authentication parameters will be reset.

If *port-string* is not specified, parameters will be set on all ports.

Mode

Switch command, read-write.

Examples

This example shows how to reset the 802.1X port control mode to auto on all ports:

```
B2(su)->clear dot1x auth-config authcontrolled-portcontrol
```

This example shows how to reset reauthentication control to disabled on ports fe.1.1-3:

```
B2(su)->clear dot1x auth-config reauthenabled fe.1.1-3
```

This example shows how to reset the 802.1X quiet period to 60 seconds on ports fe.1.1-3:

```
B2(su)->clear dot1x auth-config quietperiod fe.1.1-3
```

show eapol

Use this command to display EAPOL status or settings for one or more ports.

Syntax

show eapol [*port-string*]

Parameters

port-string	(Optional) Displays EAPOL status for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, only EAPOL enable status will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display EAPOL status for ports fe.1.1-3:

```
B2(su)->show eapol fe.1.1-3
EAPOL is disabled.

Port      Authentication State    Authentication Mode
--------   --------------------   --------------------
fe.1.1     Initialize             Auto
fe.1.2     Initialize             Auto
fe.1.3     Initialize             Auto
```

Table 19-2 provides an explanation of the command output. For details on using the **set eapol** command to enable the protocol and assign an authentication mode, refer to "set eapol" on page 19-19.

Table 19-2 show eapol Output Details

Output Field	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
Authentication State	Current EAPOL authentication state for each port. Possible internal states for the authenticator (switch) are: • **initialize**: A port is in the initialize state when: – authentication is disabled, – authentication is enabled and the port is not linked, or – authentication is enabled and the port is linked. (In this case very little time is spent in this state, it immediately transitions to the connecting state, via disconnected. • **disconnected**: The port passes through this state on its way to connected whenever the port is reinitialized, via link state change, reauthentication failure, or management intervention. • **connecting**: While in this state, the authenticator sends request/ID messages to the end user. • **authenticating**: The port enters this state from connecting after receiving a response/ID from the end user. It remains in this state until the entire authentication exchange between the end user and the authentication server completes. • **authenticated**: The port enters this state from authenticating state after the exchange completes with a favorable result. It remains in this state until linkdown, logoff, or until a reauthentication begins. • **aborting**: The port enters this state from authenticating when any event occurs that interrupts the login exchange. • **held**: After any login failure the port remains in this state for the number of seconds equal to quietPeriod (can be set using MIB). • **forceAuth**: Management is allowing normal, unsecured switching on this port. • **forceUnauth**: Management is preventing any frames from being forwarded to or from this port.
Authentication Mode	Mode enabling network access for each port. Modes include: • **Auto**: Frames are forwarded according to the authentication state of each port. • **Forced Authorized Mode**: Meant to disable authentication on a port. It is intended for ports that support ISLs and devices that cannot authenticate, such as printers and file servers. If a default policy is applied to the port via the policy profile MIB, then frames are forwarded according to the configuration set by that policy, otherwise frames are forwarded according to the current configuration for that port. Authentication using 802.1X is not possible on a port in this mode. • **Forced Unauthorized Mode**: All frames received on the port are discarded by a filter. Authentication using 802.1X is not possible on a port in this mode.

set eapol

Use this command to enable or disable EAPOL port-based user authentication with the RADIUS server and to set the authentication mode for one or more ports.

Syntax

set eapol [**enable** | **disable**] [**auth-mode** {**auto** | **forced-auth** | **forced-unauth**} *port-string*

Parameters

enable | **disable**	Enables or disables EAPOL.
auth-mode	Specifies the authentication mode as:
auto | **forced-auth** | **forced-unauth**	• **auto** - Auto authorization mode. This is the default mode and will forward frames according to the authentication state of the port. For details on this mode, refer to Table 19-2. • **forced-auth** - Forced authorized mode, which disables authentication on the port. • **forced-unauth** - Forced unauthorized mode, which filters and discards all frames received on the port.
port-string	Specifies the port(s) on which to set EAPOL parameters. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example shows how to enable EAPOL:

```
B2(su)->set eapol enable
```

This example shows how to enable EAPOL with forced authorized mode on port fe.1.1:

```
B2(su)->set eapol auth-mode forced-auth fe.1.1
```

clear eapol

Use this command to globally clear the EAPOL authentication mode, or to clear settings for one or more ports.

Syntax

clear eapol [**auth-mode**] [*port-string*]

Parameters

auth-mode	(Optional) Globally clears the EAPOL authentication mode.
port-string	Specifies the port(s) on which to clear EAPOL parameters. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If **auth-mode** is not specified, all EAPOL settings will be cleared.

If *port-string* is not specified, settings will be cleared for all ports.

Mode

Switch command, read-write.

Example

This example shows how to clear the EAPOL authentication mode for port ge.1.3:

```
B2(su)->clear eapol auth-mode ge.1.3
```

Configuring MAC Authentication

Purpose

To review, disable, enable and configure MAC authentication. This authentication method allows the device to authenticate source MAC addresses in an exchange with an authentication server. The authenticator (switch) selects a source MAC seen on a MAC-authentication enabled port and submits it to a backend client for authentication. The backend client uses the MAC address stored password, if required, as credentials for an authentication attempt. If accepted, a string representing an access policy may be returned. If present, the switch applies the associated policy rules.

You can specify a mask to apply to MAC addresses when authenticating users through a RADIUS server (see "set macauthentication significant-bits" on page 19-31). The most common use of significant bit masks is for authentication of all MAC addresses for a specific vendor.

Commands

For information about...	Refer to page...
show macauthentication	19-21
show macauthentication session	19-23
set macauthentication	19-24
set macauthentication password	19-24
clear macauthentication password	19-25
set macauthentication port	19-25
set macauthentication portinitialize	19-26
set macauthentication portquietperiod	19-26
clear macauthentication portquietperiod	19-27
set macauthentication macinitialize	19-27
set macauthentication reauthentication	19-28
set macauthentication portreauthenticate	19-28
set macauthentication macreauthenticate	19-29
set macauthentication reauthperiod	19-29
clear macauthentication reauthperiod	19-30
set macauthentication significant-bits	19-31
clear macauthentication significant-bits	19-31

show macauthentication

Use this command to display MAC authentication information for one or more ports.

Syntax

show macauthentication [*port-string*]

Parameters

port-string	(Optional) Displays MAC authentication information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, MAC authentication information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display MAC authentication information for ge.2.1 through 8:

```
B2(su)->show macauthentication ge.2.1-8
MAC authentication:           - enabled
MAC user password:            - NOPASSWORD
Port username significant bits  - 48

 Port     Port     Reauth     Auth     Auth      Reauthentications
          State    Period     Allowed  Allocated
 -------  -------- ---------- -------- --------- -----------------
 ge.2.1   disabled 3600       1        1         disabled
 ge.2.2   disabled 3600       1        1         disabled
 ge.2.3   disabled 3600       1        1         disabled
 ge.2.4   disabled 3600       1        1         disabled
 ge.2.5   disabled 3600       1        1         disabled
 ge.2.6   disabled 3600       1        1         disabled
 ge.2.7   disabled 3600       1        1         disabled
 ge.2.8   disabled 3600       1        1         disabled
```

Table 19-3 provides an explanation of the command output.

Table 19-3 show macauthentication Output Details

Output Field	What It Displays...
MAC authentication	Whether MAC authentication is globally enabled or disabled. Set using the **set macauthentication** command as described in "set macauthentication" on page 19-24.
MAC user password	User password associated with MAC authentication on the device. Set using the **set macauthentication password** command as described in "set macauthentication password" on page 19-24.
Port username significant bits	Number of significant bits in the MAC addresses to be used starting with the left-most bit of the vendor portion of the MAC address. The significant portion of the MAC address is sent as a user-name credential when the primary attempt to authenticate the full MAC address fails. Any other failure to authenticate the full address, (i.e., authentication server timeout) causes the next attempt to start once again with a full MAC authentication. Default value of 48 can be changed with the **set macauthentication significant-bits** command.
Port	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
Port State	Whether or not MAC authentication is enabled or disabled on this port.

Table 19-3 show macauthentication Output Details (Continued)

Output Field	What It Displays...
Reauth Period	Reauthentication period for this port. Default value of **30** can be changed using the **set macauthentication reauthperiod** command (page 19-29).
Auth Allowed	Number of concurrent authentications supported on this port. Default is 1 and cannot be reset.
Auth Allocated	Maximum number of MAC authentications permitted on this port. Default is 1 and cannot be reset
Reauthentications	Whether or not reauthentication is enabled or disabled on this port. Set using the **set macauthentication reauthentication** command (page 19-28).

show macauthentication session

Use this command to display the active MAC authenticated sessions.

Syntax

```
show macauthentication session
```

Parameters

None.

Defaults

If *port-string* is not specified, MAC session information will be displayed for all MAC authentication ports.

Mode

Switch command, read-only.

Usage

Changing the Reauth Period with the set macauthentication reauthperiod command does not affect current sessions. New sessions display the correct period.

Example

This example shows how to display MAC session information:

```
B2(su)->show macauthentication session
Port       MAC Address      Duration   Reauth Period   Reauthentications
-----    -----------------  ---------- -------------   -----------------
ge.1.2   00:60:97:b5:4c:07  0,00:52:31  3600           disabled
```

Table 19-4 provides an explanation of the command output.

Table 19-4 show macauthentication session Output Details

Output Field	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
MAC Address	MAC address associated with the session.

Table 19-4 show macauthentication session Output Details (Continued)

Output Field	What It Displays...
Duration	Time this session has been active.
Reauth Period	Reauthentication period for this port, set using the **set macauthentication reauthperiod** command described in “set macauthentication reauthperiod” on page 19-29.
Reauthentications	Whether or not reauthentication is enabled or disabled on this port. Set using the **set macauthentication reauthentication** command described in “set macauthentication reauthentication” on page 19-28.

set macauthentication

Use this command to globally enable or disable MAC authentication.

Syntax

`set macauthentication {enable | disable}`

Parameters

enable | **disable**	Globally enables or disables MAC authentication.

Mode

Switch command, read-write.

Defaults

None.

Example

This example shows how to globally enable MAC authentication:

```
B2(su)->set macauthentication enable
```

set macauthentication password

Use this command to set a MAC authentication password.

Syntax

`set macauthentication password` *`password`*

Parameters

password	Specifies a text string MAC authentication password.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the MAC authentication password to “macauth”:

```
B2(su)->set macauthentication password macauth
```

clear macauthentication password

Use this command to clear the MAC authentication password.

Syntax

clear macauthentication password

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the MAC authentication password:

```
B2(su)->clear macauthentication password
```

set macauthentication port

Use this command to enable or disable one or more ports for MAC authentication.

Syntax

set macauthentication port {**enable** | **disable**} *port-string*

Parameters

enable | **disable**	Enables or disables MAC authentication.
port-string	Specifies port(s) on which to enable or disable MAC authentication. For a detailed description of possible *port-string* values, refer to “Port String Syntax Used in the CLI” on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Usage

Enabling port(s) for MAC authentication requires globally enabling MAC authentication on the switch as described in "set macauthentication" on page 19-24, and then enabling it on a port-by-port basis. By default, MAC authentication is globally disabled and disabled on all ports.

Example

This example shows how to enable MAC authentication on ge.2.1 though 5:

```
B2(su)->set macauthentication port enable ge.2.1-5
```

set macauthentication portinitialize

Use this command to force one or more MAC authentication ports to re-initialize and remove any currently active sessions on those ports.

Syntax

set macauthentication portinitialize *port-string*

Parameters

port-string	Specifies the MAC authentication port(s) to re-initialize. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to force ge.2.1 through 5 to initialize:

```
B2(su)->set macauthentication portinitialize ge.2.1-5
```

set macauthentication portquietperiod

This sets the number of seconds following a failed authentication before another attempt may be made on the port.

Syntax

set macauthentication portquietperiod *time port-string*

Parameters

time	Period in seconds to wait after a failed authentication. By default, this is 30 seconds.
port-string	Specifies the ports for which the quit period is to be applied. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example sets port 1 to wait 5 seconds after a failed authentication attempt before a new attempt can be made:

```
B2(su)->set macauthentication portquietperiod 5 ge.1.1
```

clear macauthentication portquietperiod

This sets the quiet period back to the default value of 30 seconds.

Syntax

clear macauthentication portquietperiod [*port-string*]

Parameters

port-string	(Optional) Specifies the ports for which the quiet period is to be reset. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If a *port-string* is not specified then all ports will be set to the default port quiet period.

Mode

Switch command, read-write.

Example

This example resets the default quiet period on port 1:

```
B2(su)->clear macauthentication portquietperiod ge.1.1
```

set macauthentication macinitialize

Use this command to force a current MAC authentication session to re-initialize and remove the session.

Syntax

set macauthentication macinitialize *mac-addr*

Parameters

mac-addr	Specifies the MAC address of the session to re-initialize.

Mode

Switch command, read-write.

Defaults

None.

Example

This example shows how to force the MAC authentication session for address 00-60-97-b5-4c-07 to re-initialize:

```
B2(su)->set macauthentication macinitialize 00-60-97-b5-4c-07
```

set macauthentication reauthentication

Use this command to enable or disable reauthentication of all currently authenticated MAC addresses on one or more ports.

Syntax

`set macauthentication reauthentication {enable | disable}` *`port-string`*

Parameters

enable | **disable**	Enables or disables MAC reauthentication.
port-string	Specifies port(s) on which to enable or disable MAC reauthentication. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable MAC reauthentication on ge.4.1 though 5:

```
B2(su)->set macauthentication reauthentication enable ge.4.1-5
```

set macauthentication portreauthenticate

Use this command to force an immediate reauthentication of the currently active sessions on one or more MAC authentication ports.

Syntax

`set macauthentication portreauthenticate` *`port-string`*

Parameters

port-string	Specifies MAC authentication port(s) to be reauthenticated. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to force ge.2.1 though 5 to reauthenticate:

```
B2(su)->set macauthentication portreauthentication ge.2.1-5
```

set macauthentication macreauthenticate

Use this command to force an immediate reauthentication of a MAC address.

Syntax

`set macauthentication macreauthenticate` *`mac-addr`*

Parameters

mac-addr	Specifies the MAC address of the session to reauthenticate.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to force the MAC authentication session for address 00-60-97-b5-4c-07 to reauthenticate:

```
B2(su)->set macauthentication macreauthenticate 00-60-97-b5-4c-07
```

set macauthentication reauthperiod

Use this command to set the MAC reauthentication period (in seconds). This is the time lapse between attempts to reauthenticate any current MAC address authenticated to a port.

Syntax

`set macauthentication reauthperiod` *`time port-string`*

Parameters

time	Specifies the number of seconds between reauthentication attempts. Valid values are **1** - **4294967295**.
port-string	Specifies the port(s) on which to set the MAC reauthentication period. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Usage

Changing the Reauth Period with the **set macauthentication reauthperiod** command does not affect current sessions. New sessions will use the correct period.

Example

This example shows how to set the MAC reauthentication period to 7200 seconds (2 hours) on ge.2.1 through 5:

```
B2(su)->set macauthentication reauthperiod 7200 ge.2.1-5
```

clear macauthentication reauthperiod

Use this command to clear the MAC reauthentication period on one or more ports.

Syntax

`clear macauthentication reauthperiod` [*`port-string`*]

Parameters

port-string	(Optional) Clears the MAC reauthentication period on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, the reauthentication period will be cleared on all ports.

Mode

Switch command, read-write.

Example

This example shows how to globally clear the MAC reauthentication period:

```
B2(su)->clear macauthentication reauthperiod
```

set macauthentication significant-bits

Use this command to set the number of significant bits of the MAC address to use for authentication.

Syntax

set macauthentication significant-bits *number*

Parameters

number	Specifies the number of significant bits to be used for authentication.

Defaults

None.

Mode

Switch command, read-write.

Usage

This command allows you to specify a mask to apply to MAC addresses when authenticating users through a RADIUS server. The most common use of significant bit masks is for authentication of all MAC addresses for a specific vendor.

On switches using MAC authentication, the MAC address of a user attempting to log in is sent to the RADIUS server as the user name. If access is denied, and if a significant bit mask has been configured (other than 48) with this command, the switch will apply the mask and resend the masked address to the RADIUS server. For example, if a user with MAC address of 00-16-CF-12-34-56 is denied access, and a 32 bit mask has been configured, the switch will apply the mask and resend a MAC address of 00-16-CF-12-00-00 to the RADIUS server.

To use a significant bits mask for authentication of devices by a particular vendor, specify a 24-bit mask, to mask out everything except the vendor portion of the MAC address.

Example

This example sets the MAC authentication significant bits mask to 24.

```
B2(su)->set macauthentication significant-bits 24
```

clear macauthentication significant-bits

Use this command to reset the number of significant bits of the MAC address to use for authentication to the default of 48.

Syntax

clear macauthentication significant-bits

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example resets the MAC authentication significant bits to 48.

```
B2(su)->clear macauthentication significant-bits
```

Configuring Multiple Authentication Methods

Note: B2 devices support up to three authenticated users per port.

About Multiple Authentication Types

When enabled, multiple authentication types allow users to authenticate using more than one method on the same port. In order for multiple authentication to function on the device, each possible method of authentication (MAC authentication, 802.1X, PWA) must be enabled globally and configured appropriately on the desired ports with its corresponding command set described in this chapter.

Multiple authentication mode must be globally enabled on the device using the set multiauth mode command.

Configuring Multi-User Authentication (User + IP phone)

The User + IP phone multi-user authentication feature allows a user and their IP phone to both use a single port on the B2 but to have separate policy roles.

Note: The only Multi-User Authentication supported on the B2 is User + IP phone. The IP phone and the user may authenticate using 802.1x or MAC authentication.

"User + IP Phone" Authentication on the SecureStack B2 is implemented by assigning an ingressed packet received on a port to a policy role based on the VLAN the packet was assigned to, and not the packet's source MAC address. Therefore, on a port configured for User + IP Phone Authentication, there exists two different VLAN-to-policy role mappings.

The policy role for the IP phone is statically mapped using the VLAN-to-policy mapping feature which assigns any packets received with a VLAN tag set to a specific VID (for example, Voice VLAN) to an indicated policy role (for example, IP Phone policy role). Therefore, it is required that IP phone is configured to send VLAN tagged packets to the “Voice” VLAN. Refer to the **Usage** section for the command “set policy rule” on page 12-10 for additional information.

The second policy role, for the user, can either be statically configured with the default policy role on the port or dynamically assigned through authentication to the network. When the default policy role is assigned on a port, the VLAN set as the port's PVID is mapped to the default policy role. When a policy role is dynamically applied to a port as the result of a successfully authenticated session, the “authenticated VLAN” is mapped to the policy role set in the Filter-ID returned from the RADIUS server. The “authenticated VLAN” may either be the PVID of the port, if the PVID Override for the policy profile is disabled, or the VLAN specified in the PVID Override if the PVID Override is enabled.

Commands

For information about...	Refer to page...
show multiauth	19-34
set multiauth mode	19-35
clear multiauth mode	19-35

For information about...	Refer to page...
set multiauth precedence	19-36
clear multiauth precedence	19-36
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show multiauth station	19-39
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clear multiauth idle-timeout	19-42
show multiauth session-timeout	19-42
set multiauth session-timeout	19-43
clear multiauth session-timeout	19-44

show multiauth

Use this command to display multiple authentication system configuration.

Syntax

show multiauth

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display multiple authentication system configuration:

```
B2(rw)->show multiauth

Multiple authentication system configuration
------------------------------------------------
Supported types               : dot1x, pwa, mac
Maximum number of users       : 768
Current number of users       : 2
System mode                   : multi
Default precedence            : dot1x, pwa, mac
Admin precedence              : dot1x, pwa, mac
Operational precedence        : dot1x, pwa, mac
```

set multiauth mode

Use this command to set the system authentication mode to allow multiple authenticators simultaneously (802.1x, PWA, and MAC Authentication) on a single port, or to strictly adhere to 802.1x authentication.

Syntax

set multiauth mode {**multi** | **strict**}

Parameters

multi	Allows the system to use multiple authenticators simultaneously (802.1x, PWA, and MAC Authentication) on a port. This is the default mode.
strict	User must authenticate using 802.1x authentication before normal traffic (anything other than authentication traffic) can be forwarded.

Defaults

None.

Mode

Switch command, read-write.

Usage

Multiauth **multi** mode requires that MAC, PWA, and 802.1X authentication be enabled globally, and configured appropriately on the desired ports according to their corresponding command sets described in this chapter. Refer to "Configuring 802.1X Authentication" on page 19-11 and "Configuring MAC Authentication" on page 19-21 and "Configuring Port Web Authentication (PWA)" on page 19-61.

Example

This example shows how to enable simultaneous multiple authentications:

```
B2(rw)->set multiauth mode multi
```

clear multiauth mode

Use this command to clear the system authentication mode.

Syntax

clear multiauth mode

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the system authentication mode:

```
B2(rw)->clear multiauth mode
```

set multiauth precedence

Use this command to set the system's multiple authentication administrative precedence.

Syntax

set multiauth precedence {[**dot1x**] [**mac**] }

Parameters

dot1x	Sets precedence for 802.1X authentication.
mac	Sets precedence for MAC authentication.

Defaults

None.

Mode

Switch command, read-write.

Usage

When a user is successfully authenticated by more than one method at the same time, the precedence of the authentication methods will determine which RADIUS-returned filter ID will be processed and result in an applied traffic policy profile.

Example

This example shows how to set precedence for MAC authentication:

```
B2(rw)->set multiauth precedence mac dot1x
```

clear multiauth precedence

Use this command to clear the system's multiple authentication administrative precedence.

Syntax

clear multiauth precedence

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the multiple authentication precedence:

```
B2(rw)->clear multiauth precedence
```

show multiauth port

Use this command to display multiple authentication properties for one or more ports.

Syntax

show multiauth port [*port-string*]

Parameters

port-string	(Optional) Displays multiple authentication information for specific port(s).

Defaults

If port-string is not specified, multiple authentication information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display multiple authentication information for ports ge.3.1-4:

```
B2(rw)->show multiauth port ge.3.1-4

Port          Mode         Max       Allowed    Current
                          users       users      users
------------ ------------ ---------- ---------- ----------
ge.3.1       auth-opt     8         8          0
ge.3.2       auth-opt     8         8          0
ge.3.3       auth-opt     8         8          0
ge.3.4       auth-opt     8         8          0
```

set multiauth port

Use this command to set multiple authentication properties for one or more ports.

Syntax

set multiauth port mode {**auth-opt** | **auth-reqd** | **force-auth** | **force-unauth**} | **numusers** *numusers port-string*

Parameters

mode **auth-opt** | **auth-reqd** | **force-auth** | **force-unauth**	Specifies the port(s)' multiple authentication mode as: • **auth-opt** — Authentication optional ("non-strict" behavior). If a user does not attempt to authenticate using 802.1x, or if 802.1x authentication fails, the port will allow traffic to be forwarded according to the defined default VLAN. • **auth-reqd** — Authentication is required. • **force-auth** — Authentication considered. • **force-unauth** — Authentication disabled.
numusers *numusers*	Specifies the number of users allowed authentication on port(s). Valid values are 0 to 8.
port-string	Specifies the port(s) on which to set multiple authentication properties.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example shows how to set the port multiple authentication mode to required on ge.3.14:

```
B2(rw)->set multiauth port mode auth-reqd ge.3.14
```

This example shows how to set the number of users allowed to authenticate on port ge.3.14 to 8:

```
B2(rw)->set multiauth port numusers 8 ge.3.14
```

clear multiauth port

Use this command to clear multiple authentication properties for one or more ports.

Syntax

clear multiauth port {**mode** | **numusers**} *port-string*

Parameters

mode	Clears the specified port's multiple authentication mode.
numusers	Clears the value set for the number of users allowed authentication on the specified port.
port-string	Specifies the port or ports on which to clear multiple authentication properties.

Defaults

None.

Mode

Switch command, read-write.

Examples

This example shows how to clear the port multiple authentication mode on port ge.3.14:

```
B2(rw)->clear multiauth port mode ge.3.14
```

This example shows how to clear the number of users on port ge.3.14:

```
B2(rw)->clear multiauth port numusers ge.3.14
```

show multiauth station

Use this command to display multiple authentication station (end user) entries.

Syntax

show multiauth station [**mac** *address*] [**port** *port-string*]

Parameters

mac *address*	(Optional) Displays multiple authentication station entries for specific MAC address(es).
port *port-string*	(Optional) Displays multiple authentication station entries for specific port(s).

Mode

Switch command, read-only.

Defaults

If no options are specified, multiple authentication station entries will be displayed for all MAC addresses and ports.

Example

This example shows how to display multiple authentication station entries. In this case, two end user MAC addresses are shown:

```
B2(rw)->show multiauth station
Port         Address type  Address
------------ ------------  ------------------------
fe.1.20      mac           00-10-a4-9e-24-87
fe.2.16      mac           00-b0-d0-e5-0c-d0
```

show multiauth session

Use this command to display multiple authentication session entries.

Syntax

show multiauth session [**all**] [**agent** {**dot1x** | **mac** | **pwa**}] [**mac** *address*] [**port** *port-string*]

Parameters

all	(Optional) Displays information about all sessions, including those with terminated status.
agent dot1x | **mac** | **pwa**	(Optional) Displays 802.1X, or MAC, or port web authentication session information.
mac *address*	(Optional) Displays multiple authentication session entries for specific MAC address(es).
port *port-string*	(Optional) Displays multiple authentication session entries for the specified port or ports.

Defaults

If no options are specified, multiple authentication session entries will be displayed for all sessions, authentication types, MAC addresses, and ports.

Mode

Switch command, read-only.

Example

This example shows how to display multiple authentication session information for port ge.1.1.

```
B2(su)->show multiauth session port ge.1.1
_____________________________________________
Port             | ge.1.1            Station address   | 00-01-03-86-0A-87
Auth status      | success           Last attempt      | FRI MAY 18 11:16:36 2007
Agent type       | dot1x             Session applied   | true
Server type      | radius            VLAN-Tunnel-Attr  | none
Policy index     | 0                 Policy name       | Administrator
Session timeout  | 0                 Session duration  | 0,00:00:25
Idle timeout     | 5                 Idle time         | 0,00:00:00
Termination time | Not Terminated
```

show multiauth idle-timeout

Use this command to display the timeout value, in seconds, for an idle session for all authentication methods.

Syntax

show multiauth idle-timeout

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display timeout values for an idle session for all authentication types.

```
B2(su)->show multiauth idle-timeout
Authentication type  Timeout (sec)
-------------------- -------------
dot1x                0
pwa                  0
mac                  0
```

set multiauth idle-timeout

Use this command to set the maximum number of consecutive seconds an authenticated session may be idle before termination of the session.

Syntax

set multiauth idle-timeout [**dot1x** | **mac** | **pwa**] *timeout*

Parameters

dot1x	(Optional) Specifies the IEEE 802.1X port-based network access control authentication method for which to set the timeout value.
mac	(Optional) Specifies the Enterasys MAC authentication method for which to set the timeout value.
pwa	(Optional) Specifies the Enterasys Port Web Authentication method for which to set the timeout value.
timeout	Specifies the timeout value in seconds. The value can range from 0 to 65535. A value of 0 means that no idle timeout will be applied unless an idle timeout value is provided by the authenticating server.

Defaults

If no authentication method is specified, the idle timeout value is set for all authentication methods.

Mode

Switch mode, read-write.

Usage

If you set an idle timeout value, a MAC user whose MAC address has aged out of the forwarding database will be unauthenticated if no traffic has been seen from that address for the specified idle timeout period.

A value of zero indicates that no idle timeout will be applied unless an idle timeout value is provided by the authenticating server. For example, if a session is authenticated by a RADIUS server, that server may encode a Idle-Timeout Attribute in its authentication response.

Example

This example sets the idle timeout value for all authentication methods to 300 seconds.

```
B2(su)->set multiauth idle-timeout 300
```

clear multiauth idle-timeout

Use this command to reset the maximum number of consecutive seconds an authenticated session may be idle before termination of the session to its default value of 0.

Syntax

```
clear multiauth idle-timeout [dot1x | mac | pwa]
```

Parameters

dot1x	(Optional) Specifies the IEEE 802.1X port-based network access control authentication method for which to reset the timeout value to its default.
mac	(Optional) Specifies the Enterasys MAC authentication method for which to reset the timeout value to its default.
pwa	(Optional) Specifies the Enterasys Port Web Authentication method for which to reset the timeout value to its default.

Defaults

If no authentication method is specified, the idle timeout value is reset to its default value of 0 for all authentication methods.

Mode

Switch mode, read-write.

Example

This example resets the idle timeout value for all authentication methods to 0 seconds.

```
B2(su)->clear multiauth idle-timeout
```

show multiauth session-timeout

Use this command to display the session timeout value, in seconds, for all authentication methods.

Syntax

```
show multiauth session-timeout
```

Parameters

None.

Defaults

None.

Mode

Switch mode, read-only.

Example

This example displays the session timeout values for all authentication methods.

```
B2(su)->show multiauth session-timeout
Authentication type  Timeout (sec)
-------------------- -------------
dot1x                0
pwa                  0
mac                  0
```

set multiauth session-timeout

Use this command to set the maximum number of seconds an authenticated session may last before termination of the session.

Syntax

set multiauth session-timeout [**dot1x** | **mac** | **pwa**] *timeout*

Parameters

dot1x	(Optional) Specifies the IEEE 802.1X port-based network access control authentication method for which to set the session timeout value.
mac	(Optional) Specifies the Enterasys MAC authentication method for which to set the session timeout value.
pwa	(Optional) Specifies the Enterasys Port Web Authentication method for which to set the session timeout value.
timeout	Specifies the timeout value in seconds. The value can range from 0 to 65535. A value of 0 means that no session timeout will be applied unless a session timeout value is provided by the authenticating server.

Defaults

If no authentication method is specified, the session timeout value is set for all authentication methods.

Mode

Switch mode, read-write.

Usage

A value of zero may be superseded by a session timeout value provided by the authenticating server. For example, if a session is authenticated by a RADIUS server, that server may encode a Session-Timeout Attribute in its authentication response.

Example

This example sets the session timeout value for the IEEE 802.1X authentication method to 300 seconds.

```
B2(su)->set multiauth session-timeout dot1x 300
```

clear multiauth session-timeout

Use this command to reset the maximum number of consecutive seconds an authenticated session may last before termination of the session to its default value of 0.

Syntax

```
clear multiauth session-timeout [dot1x | mac | pwa]
```

Parameters

dot1x	(Optional) Specifies the IEEE 802.1X port-based network access control authentication method for which to reset the timeout value to its default.
mac	(Optional) Specifies the Enterasys MAC authentication method for which to reset the timeout value to its default.
pwa	(Optional) Specifies the Enterasys Port Web Authentication method for which to reset the timeout value to its default.

Defaults

If no authentication method is specified, the session timeout value is reset to its default value of 0 for all authentication methods.

Mode

Switch mode, read-write.

Example

This example resets the session timeout value for the IEEE 802.1X authentication method to 0 seconds.

```
B2(su)->clear multiauth session-timeout dot1x
```

Configuring VLAN Authorization (RFC 3580)

Purpose

RFC 3580 Tunnel Attributes provide a mechanism to contain an 802.1X authenticated or a MAC authenticated user to a VLAN regardless of the PVID. Up to three users can be configured per Gigabit port.

Please see section 3-31 of RFC 3580 for details on configuring a RADIUS server to return the desired tunnel attributes. As stated in RFC 3580, "... it may be desirable to allow a port to be placed into a particular Virtual LAN (VLAN), defined in [IEEE8021Q], based on the result of the authentication."

The RADIUS server typically indicates the desired VLAN by including tunnel attributes within its Access-Accept parameters. However, the IEEE 802.1X or MAC authenticator can also be configured to instruct the VLAN to be assigned to the supplicant by including tunnel attributes within Access-Request parameters.

The following tunnel attributes are used in VLAN authorization assignment, :

- Tunnel-Type - VLAN (13)
- Tunnel-Medium-Type - 802
- Tunnel-Private-Group-ID - VLANID

In order to authenticate multiple RFC 3580 users, policy maptable response must be set to **tunnel** as described in this section.

Notes: The B2 cannot simultaneously support Policy and RFC 3580 on the same port. If multiple users are configured to use a port, and the B2 is then switched from "policy" mode to RFC-3580 "tunnel" mode, the total number of users supported to use a port will be reset to one.

A policy license, if applicable, is not required to run RFC3580.

Commands

For information about...	Refer to page...
show policy maptable response	19-45
set policy maptable response	19-46
set vlanauthorization	19-47
set vlanauthorization egress	19-48
clear vlanauthorization	19-48
show vlanauthorization	19-49

show policy maptable response

Displays the current policy maptable response setting. When VLAN authorization is enabled (as described in this section) and the policy maptable response is **tunnel**, you can use the **set**

multiauth port command (page 19-37) to set the number of RFC 3580 users (numusers) allowed per Gigabit port. Up to three users can be configured per Gigabit port.

Syntax

```
show policy maptable response
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the current policy maptable response setting:

```
B2(rw)->show policy maptable response
```

policy

set policy maptable response

Sets the maptable response from the default of policy to tunnel to allow up to three VLAN authorized users to be configured per Gigabit port.

Syntax

```
set policy maptable response {policy | tunnel}
```

Parameters

policy	Sets the maptable response to policy. This is the default setting, which allows authentication of up to three multiauth users per port.
tunnel	Sets the maptable response to tunnel, which allows authentication of up to three multiauth users per port. This setting is required to configure VLAN authorization for multiple users per Gigabit port.

Defaults

Set to policy.

Mode

Switch command, read-write.

Usage

This command puts the switch in either “policy mode” (the default) or “tunnel mode,” which is RFC3580 VLAN mapping.

When a user successfully authenticates to the network, the RADIUS server returns an Access-Accept frame. This frame can have many attributes, two of which are a Filter ID (which is how policy assignment is achieved) and RFC 3580 VLAN assignment.

If a switch is in **tunnel** mode:

- The FID (Filter ID) is always ignored, but Default policy rules still apply.
- The VLAN attribute is used if present, and if VLAN authorization is enabled. See "set vlanauthorization" on page 19-47.

If a switch is in **policy** mode:

- If the Access-Accept frame has the FID attribute only, then the FID is used.
- If the Access-Accept frame has the VLAN attribute only, then it is used provided that VLAN authorization is enabled. See "set vlanauthorization" on page 19-47.
- If both attributes are returned, use the FID only.

Examples

This example shows how to set the policy maptable response to tunnel:

```
B2(rw)-> set policy maptable response tunnel
```

set vlanauthorization

Enable or disable the use of the RADIUS VLAN tunnel attribute to put a port into a particular VLAN based on the result of authentication.

Syntax

set vlanauthorization {**enable** | **disable**} [*port-string*]

Parameters

enable | **disable**	Enables or disables vlan authorization/tunnel attributes.
port-string	(Optional) Specifies which ports to enable or disable the use of VLAN tunnel attributes/authorization. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

VLAN authentication is disabled by default.

Mode

Switch command, read-write.

Examples

This example shows how to enable VLAN authentication for all Gigabit Ethernet ports:

```
B2(rw)-> set vlanauthorization enable ge.*.*
```

This example shows how to disable VLAN authentication for all Gigabit Ethernet ports on switch unit/module 3:

```
B2(rw)-> set vlanauthorization disable ge.3.*
```

set vlanauthorization egress

Controls the modification of the current VLAN egress list of 802.1x authenticated ports for the VLANs returned in the RADIUS authorization filter id string.

Syntax

set vlanauthorization egress {**none** | **tagged** | **untagged**} *port-string*

Parameters

none	Specifies that no egress manipulation will be made.
tagged	Specifies that the authenticating port will be added to the current tagged egress for the VLAN-ID returned.
untagged	Specifies that the authenticating port will be added to the current untagged egress for the VLAN-ID returned (default).
port-string	Specifies that the port or list of ports. to which this command will apply. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

By default, administrative egress is set to untagged.

Mode

Switch command, read-write.

Example

This example shows how to enable the insertion of the RADIUS assigned VLAN to an 802.1q tag for all outbound frames for ports 10 through 15 on unit/module number 3.

```
B2(rw)->set vlanauthorization egress tagged ge.3.10-15
```

clear vlanauthorization

Use this command to return port(s) to the default configuration of VLAN authorization disabled, egress untagged.

Syntax

clear vlanauthorization [*port-string*]

Parameters

port-string	(Optional) Specifies which ports are to be restored to default configuration. If no port string is entered, the action will be a global setting. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If no port string is entered, all ports a will be reset to default configuration with VLAN authorization disabled and egress frames untagged.

Mode

Switch command, read-write.

Example

This example show how to clear VLAN authorization for all ports on slots 3, 4, and 5:

```
B2(rw)->clear vlanauthorization ge.3-5.*
```

show vlanauthorization

Displays the VLAN authentication status and configuration information for the specified ports.

Syntax

show vlanauthorization [*port-string*]

Parameters

port-string	(Optional) Displays VLAN authentication status for the specified ports. If no port string is entered, then the global status of the setting is displayed. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If no port string is entered, the status for all ports will be displayed.

Mode

Switch command, read-only.

Example

This command shows how to display VLAN authorization status for ge.1.1:

B2(su)->show vlanauthorization ge.1.1

Vlan Authorization: - enabled

```
port     status   administrative   operational   authenticated     vlan id
                     egress           egress     mac address
-------  --------  --------------   -----------  -----------------  -------
 ge.1.1   enabled   untagged
```

Table 19-5 provides an explanation of command output. For details on enabling and assigning protocol and egress attributes, refer to "set vlanauthorization" on page 19-47 and "set vlanauthorization egress" on page 19-48.

Table 19-5 show vlanauthorization Output Details

Output Field	What It Displays...
port	Port identification
status	Port status as assigned by set vlanauthorization command
administrative egress	Port status as assigned by the set vlanauthorization egress command
operational egress	Port operational status of vlanauthorization egress.

Table 19-5 show vlanauthorization Output Details (Continued)

Output Field	What It Displays...
authenticated mac address	If authentication has succeeded, displays the MAC address assigned for egress.
vlan id	If authentication has succeeded, displays the assigned VLAN id for ingress.

Configuring MAC Locking

This feature locks a MAC address to one or more ports, preventing connection of unauthorized devices through the port(s). When source MAC addresses are received on specified ports, the switch discards all subsequent frames not containing the configured source addresses. The only frames forwarded on a "locked" port are those with the "locked" MAC address(es) for that port.

There are two methods of locking a MAC to a port: first arrival and static. The first arrival method is defined to be locking the first *n* number of MACs which arrive on a port configured with MAC locking enabled. The value *n* is configured with the **set maclock firstarrival** command.

The static method is defined to be statically provisioning a MAC-port lock using the **set maclock** command. The maximum number of static MAC addresses allowed for MAC locking on a port can be configured with the **set maclock static** command.

You can configure the switch to issue a violation trap if a packet arrives with a source MAC address different from any of the currently locked MAC addresses for that port.

MACs are unlocked as a result of:

- A link down event
- When MAC locking is disabled on a port
- When a MAC is aged out of the forwarding database when FirstArrival aging is enabled

When properly configured, MAC locking is an excellent security tool as it prevents MAC spoofing on configured ports. Also if a MAC were to be secured by something like Dragon Dynamic Intrusion Detection, MAC locking would make it more difficult for a hacker to send packets into the network because the hacker would have to change their MAC address and move to another port. In the meantime the system administrator would be receiving a maclock trap notification.

Purpose

To review, disable, enable, and configure MAC locking.

Commands

For information about...	Refer to page...
show maclock	19-51
show maclock stations	19-52
set maclock enable	19-53
set maclock disable	19-54
set maclock	19-54
clear maclock	19-55

For information about...	Refer to page...
set maclock static	19-56
clear maclock static	19-56
set maclock firstarrival	19-57
clear maclock firstarrival	19-58
set maclock agefirstarrival	19-58
clear maclock agefirstarrival	19-59
set maclock move	19-59
set maclock trap	19-60

show maclock

Use this command to display the status of MAC locking on one or more ports.

Syntax

show maclock [*port-string*]

Parameters

port-string	(Optional) Displays MAC locking status for specified port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, MAC locking status will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display MAC locking information for ge.1.1.

```
B2(su)->show maclock ge.1.1
MAC locking is globally enabled

 Port      Port    Trap    Aging    Max Static  Max FirstArrival  Last Violating
Number   Status   Status   Status   Allocated     Allocated       MAC Address
-------  -------  -------- -------  ---------- ---------------  ---------------
ge.1.1   enabled  disabled  enabled  20         1               00:a0:c9:39:5c:b4
```

Table 19-6 provides an explanation of the command output.

Table 19-6 show maclock Output Details

Output Field	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
Port Status	Whether MAC locking is **enabled** or **disabled** on the port. MAC locking is globally disabled by default. For details on enabling MAC locking on the switch and on one or more ports, refer to "set maclock enable" on page 19-53 and "set maclock" on page 19-54.
Trap Status	Whether MAC lock trap messaging is **enabled** or **disabled** on the port. For details on setting this status, refer to "set maclock trap" on page 19-60.
Aging Status	Whether aging of FirstArrival MAC addresses is **enabled** or **disabled** on the port. Refer to "set maclock agefirstarrival" on page 19-58.
Max Static Allocated	The maximum static MAC addresses allowed locked to the port. For details on setting this value, refer to "set maclock static" on page 19-56.
Max FirstArrival Allocated	The maximum end station MAC addresses allowed locked to the port. For details on setting this value, refer to "set maclock firstarrival" on page 19-57.
Last Violating MAC Address	Most recent MAC address(es) violating the maximum static and first arrival value(s) set for the port.

show maclock stations

Use this command to display MAC locking information about end stations connected to the switch.

Syntax

```
show maclock stations [firstarrival | static] [port-string]
```

Parameters

firstarrival	(Optional) Displays MAC locking information about end stations first connected to MAC locked ports.
static	(Optional) Displays MAC locking information about static (management defined) end stations connected to MAC locked ports.
port-string	(Optional) Displays end station information for specified port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If no parameters are specified, MAC locking information will be displayed for all end stations.

Mode

Switch command, read-only.

Example

This example shows how to display MAC locking information for the end stations connected to all Gigabit Ethernet ports in unit/module 2:

```
B2(su)->show maclock stations fe.2.*
 Port Number  MAC Address          Status         State          Aging
 ------------ -----------------    -------------- -------------- -----
 fe.2.1       00:a0:c9:39:5c:b4    active         first arrival  true
 fe.2.7       00:a0:c9:39:1f:11    active         static         false
```

Table 19-7 provides an explanation of the command output.

Table 19-7 show maclock stations Output Details

Output Field	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
MAC address	MAC address of the end station(s) locked to the port.
Status	Whether the end stations are **active** or **inactive**.
State	Whether the end station locked to the port is a **first arrival** or **static** connection.
Aging	When true, FirstArrival MACs that have aged out of the forwarding database will be removed for the associated port lock.

set maclock enable

Use this command to enable MAC locking globally or on one or more ports.

Note: MAC locking needs to be enabled globally and on appropriate ports for it to function.

Syntax

set maclock enable [*port-string*]

Parameters

port-string	(Optional) Enables MAC locking on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, MAC locking will be enabled globally.

Mode

Switch command, read-write.

Usage

When enabled and configured, MAC locking defines which MAC addresses, as well as how many MAC addresses are permitted to use specific port(s).

MAC locking is disabled by default at device startup. Configuring one or more ports for MAC locking requires globally enabling it on the device and then enabling it on the desired ports.

Example

This example shows how to enable MAC locking on fe.2.3:

```
B2(su)->set maclock enable fe.2.3
```

set maclock disable

Use this command to disable MAC locking globally or on one or more ports.

Syntax

set maclock disable [*port-string*]

Parameters

port-string	(Optional) Disables MAC locking on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, MAC locking will be disabled globally on the switch.

Mode

Switch command, read-write.

Example

This example shows how to disable MAC locking on fe.2.3:

```
B2(su)->set maclock disable fe.2.3
```

set maclock

Use this command to create a static MAC address-to-port locking, and to enable or disable MAC locking for the specified MAC address and port.

Syntax

set maclock *mac-address port-string* {**create** | **enable** | **disable**}

Parameters

mac-address	Specifies the MAC address for which MAC locking will be created, enabled or disabled.
port-string	Specifies the port on which to create, enable or disable MAC locking for the specified MAC. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

create	Establishes a MAC locking association between the specified MAC address and port. Create automatically enables MAC locking between the specified MAC address and port.
enable | **disable**	Enables or disables MAC locking between the specified MAC address and port.

Defaults

None.

Mode

Switch command, read-write.

Usage

Configuring a port for MAC locking requires globally enabling it on the switch first using the **set maclock enable** command as described in "set maclock enable" on page 19-53.

Static MAC locking a user on multiple ports is not supported.

Statically MAC locked addresses will display in the **show mac** output (as described on page 15-20) as address type "other" and will not remove them on link down.

Example

This example shows how to create a MAC locking association between MAC address 0e-03-ef-d8-44-55 and port ge.3.2:

```
B2(rw)->set maclock 0e-03-ef-d8-44-55 ge.3.2 create
```

clear maclock

Use this command to remove a static MAC address to port locking entry.

Syntax

clear maclock *mac-address port-string*

Parameters

mac-address	Specifies the MAC address that will be removed from the list of static MACs allowed to communicate on the port.
port-string	Specifies the port on which to clear the MAC address. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Usage

The MAC address that is cleared will no longer be able to communicate on the port unless the first arrival limit has been set to a value greater than 0 and this limit has not yet been met.

For example, if user B's MAC is removed from the static MAC address list and the first arrival limit has been set to 0, then user B will not be able to communicate on the port. If user A's MAC is removed from the static MAC address list and the first arrival limit has been set to 10, but only has 7 entries, user A will become the 8th entry and allowed to communicate on the port.

Example

This example shows how to remove a MAC from the list of static MACs allowed to communicate on port ge.3.2:

```
B2(rw)->clear maclock 0e-03-ef-d8-44-55 ge.3.2
```

set maclock static

Use this command to set the maximum number of static MAC addresses allowed per port. Static MACs are administratively defined.

Syntax

`set maclock static` *`port-string value`*

Parameters

port-string	Specifies the port on which to set the maximum number of static MACs allowed. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
value	Specifies the maximum number of static MAC addresses allowed per port. Valid values are 0 to 20.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the maximum number of allowable static MACs to 2 on ge.3.1:

```
B2(rw)->set maclock static ge.3.1 2
```

clear maclock static

Use this command to reset the number of static MAC addresses allowed per port to the default value of 20.

Syntax

`clear maclock static` *`port-string`*

Parameters

port-string	Specifies the port on which to reset number of static MAC addresses allowed. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the number of allowable static MACs on fe.2.3:

```
B2(rw)->clear maclock static fe.2.3
```

set maclock firstarrival

Use this command to restrict MAC locking on a port to a maximum number of end station addresses first connected to that port.

Syntax

`set maclock firstarrival` *`port-string value`*

Parameters

port-string	Specifies the port on which to limit MAC locking. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
value	Specifies the number of first arrival end station MAC addresses to be allowed connections to the port. Valid values are **0** to **600**.

Defaults

None.

Mode

Switch command, read-write.

Usage

The maclock first arrival count resets when the link goes down. This feature is beneficial if you have roaming users—the first arrival count will be reset every time a user moves to another port, but will still protect against connecting multiple devices on a single port and will protect against MAC address spoofing.

Note: Setting a port's first arrival limit to 0 does not deny the first MAC address learned on the port from passing traffic.

Example

This example shows how to restrict MAC locking to 6 MAC addresses on fe.2.3:

```
B2(su)->set maclock firstarrival fe.2.3 6
```

clear maclock firstarrival

Use this command to reset the number of first arrival MAC addresses allowed per port to the default value of 600.

Syntax

clear maclock firstarrival *port-string*

Parameters

port-string	Specifies the port on which to reset the first arrival value. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset MAC first arrivals on fe.2.3:

```
B2(su)->clear maclock firstarrival fe.2.3
```

set maclock agefirstarrival

Use this command to enable or disable the aging of first arrival MAC addresses. When enabled, first arrival MAC addresses that are aged out of the forwarding database will be removed from the associated port MAC lock.

Syntax

set maclock agefirstarrival *port-string* {**enable** | **disable**}

Parameters

port-string	Specifies the port(s) on which to enable or disable first arrival aging. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
enable | **disable**	Enable or disable first arrival aging. By default, first arrival aging is disabled.

Defaults

None.

Mode

Switch mode, read-write.

Example

This example enables first arrival aging on port ge.1.1.

```
B2(su)-> set maclock agefirstarrival ge.1.1 enable
```

clear maclock agefirstarrival

Use this command to reset first arrival aging on one or more ports to its default state of disabled.

Syntax

clear maclock agefirstarrival *port-string*

Parameters

port-string	Specifies the port(s) on which to disable first arrival aging. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch mode, read-write.

Example

This example disables first arrival aging on port ge.1.1.

```
B2(su)-> clear maclock agefirstarrival ge.1.1 enable
```

set maclock move

Use this command to move all current first arrival MACs to static entries.

Syntax

set maclock move *port-string*

Parameters

port-string	Specifies the port on which MAC will be moved from first arrival MACs to static entries. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

None.

Mode

Switch command, read-write.

Usage

If there are more first arrival MACs than the allowed maximum static MACs, then only the latest first arrival MACs will be moved to static entries. For example, if you set the maximum number of static MACs to 2 with the **set maclock static** command, and then executed the **set maclock move** command, even though there were five MACs in the first arrival table, only the two most recent MAC entries would be moved to static entries.

Example

This example shows how to move all current first arrival MACs to static entries on ports ge.3.1-40:

```
B2(rw)->set maclock move ge.3.1-40
```

set maclock trap

Use this command to enable or disable MAC lock trap messaging.

Syntax

set maclock trap *port-string* {**enable** | **disable**}

Parameters

port-string	Specifies the port on which MAC lock trap messaging will be enabled or disabled. For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.
enable | **disable**	Enables or disables MAC lock trap messaging.

Defaults

None.

Mode

Switch command, read-write.

Usage

When enabled, this feature authorizes the switch to send an SNMP trap message if an end station is connected that exceeds the maximum values configured using the **set maclock firstarrival** and **set maclock static** commands. Violating MAC addresses are dropped from the device's (or stack's) filtering database.

Example

This example shows how to enable MAC lock trap messaging on fe.2.3:

```
B2(su)->set maclock trap fe.2.3 enable
```

Configuring Port Web Authentication (PWA)

Note: A license is required to enable PWA on the SecureStack B2 switch. Refer to the chapter entitled “Activating Licensed Features” for more information.

About PWA

PWA provides a way of authenticating users before allowing general access to the network

To log on using PWA, the user makes a request through a web browser for the PWA web page or is automatically redirected to this login page after requesting a URL in a browser.

Depending upon the authenticated state of the user, a login page or a logout page will display. When a user submits username and password, the switch then authenticates the user via a preconfigured RADIUS server. If the login is successful, then the user will be granted full network access according to the user’s policy configuration on the switch.

Note: One user per PWA-configured port can be authenticated on SecureStack B2 devices.

PWA authentication does not support RFC-3580 VLAN authorization.

Purpose

To review, enable, disable, and configure Port Web Authentication (PWA).

Commands

For information about...	Refer to page...
show pwa	19-62
set pwa	19-63
show pwa banner	19-64
set pwa banner	19-64
clear pwa banner	19-65
set pwa displaylogo	19-65
set pwa ipaddress	19-66
set pwa protocol	19-66
set pwa guestname	19-67
clear pwa guestname	19-67
set pwa guestpassword	19-68
set pwa gueststatus	19-68
set pwa initialize	19-69
set pwa quietperiod	19-69
set pwa maxrequest	19-70
set pwa portcontrol	19-70

For information about...	Refer to page...
show pwa session	19-71
set pwa enhancedmode	19-72

show pwa

Use this command to display port web authentication information for one or more ports.

Syntax

show pwa [*port-string*]

Parameters

port-string	(Optional) Displays PWA information for specific port(s).

Defaults

If *port-string* is not specified, PWA information will be displayed for all ports.

Mode

Switch command, read-only.

Example

This example shows how to display PWA information for ge.2.1:

```
B2(su)->show pwa ge.2.1
PWA Status                  - enabled
PWA IP Address              - 192.168.62.99
PWA Protocol                - PAP
PWA Enhanced Mode           - N/A
PWA Logo                    - enabled
PWA Guest Networking Status - disabled
PWA Guest Name              - guest
PWA Redirect Time           - N/A

Port     Mode              AuthStatus      QuietPeriod  MaxReq
-------- ----------------  --------------  -----------  ---------
ge.2.1   disabled          disconnected    60           16
```

Table 19-8 provides an explanation of the command output.

Table 19-8 show pwa Output Details

Output Field	What It Displays...
PWA Status	Whether or not port web authentication is enabled or disabled. Default state of disabled can be changed using the **set pwa** command as described in "set pwa" on page 19-63.
PWA IP Address	IP address of the end station from which PWA will prevent network access until the user is authenticated. Set using the **set pwa ipaddress** command as described in "set pwa ipaddress" on page 19-66.
PWA Protocol	Whether PWA protocol is CHAP or PAP. Default setting of PAP can be changed using the **set pwa protocol** command as described in "set pwa protocol" on page 19-66.

Table 19-8 show pwa Output Details (Continued)

Output Field	What It Displays...
PWA Enhanced Mode	Whether PWA enhanced mode is enabled or disabled. Default state of disabled can be changed using the set pwa enhancedmode command as described in "set pwa enhancedmode" on page 19-72.
PWA Logo	Whether the Enterasys Networks logo will be displayed or hidden at user login. Default state of enabled (displayed) can be changed using the **set pwa displaylogo** command as described in "set pwa displaylogo" on page 19-65.
PWA Guest Networking Status	Whether PWA guest user status is disabled or enabled with RADIUS or no authentication. Default state of disabled can be changed using the **set pwa gueststatus** command as described in "set pwa gueststatus" on page 19-68.
PWA Guest Name	Guest user name for PWA enhanced mode networking. Default value of "guest" can be changed using the **set pwa guestname** command as described in "set pwa guestname" on page 19-67.
PWA Guest Password	Guest user's password. Default value of an empty string can be changed using the **set pwa guestpassword** command as described in "set pwa guestpassword" on page 19-68.
PWA Redirect Time	Time in seconds after login success before the user is redirected to the PWA home page.
Port	PWA port designation.
Mode	Whether PWA is enabled or disabled on his port.
Auth Status	Whether or not the port state is disconnected, authenticating, authenticated, or held (authentication has failed).
Quiet Period	Amount of time a port will be in the held state after a user unsuccessfully attempts to log on to the network. Default value of 60 can be changed using the **set pwa quietperiod** command as described in "set pwa quietperiod" on page 19-69.
MaxReq	Maximum number of log on attempts allowed before transitioning the port to a held state. Default value of 2 can be changed using the **set pwa maxrequests** command as described in "set pwa maxrequest" on page 19-70.

set pwa

Use this command to enable or disable port web authentication.

Syntax

```
set pwa {enable | disable}
```

Parameters

enable | **disable**	Enables or disables port web authentication.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable port web authentication:

```
B2(su)->set pwa enable
```

show pwa banner

Use this command to display the port web authentication login banner string.

Syntax

show pwa banner

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display the PWA login banner:

```
B2(su)->show pwa banner
Welcome to Enterasys Networks
```

set pwa banner

Use this command to configure a string to be displayed as the PWA login banner.

Syntax

set pwa banner *string*

Parameters

string	Specifies the PWA login banner.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the PWA login banner to “Welcome to Enterasys Networks”:

```
B2(su)->set pwa banner “Welcome to Enterasys Networks”
```

clear pwa banner

Use this command to reset the PWA login banner to a blank string.

Syntax

```
clear pwa banner
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to reset the PWA login banner to a blank string

```
B2(su)->clear pwa banner
```

set pwa displaylogo

Use this command to set the display options for the Enterasys Networks logo.

Syntax

```
set pwa displaylogo {display | hide}
```

Parameters

display | **hide**	Displays or hides the Enterasys Networks logo when the PWA website displays.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to hide the Enterasys Networks logo:

```
B2(su)->set pwa displaylogo hide
```

set pwa ipaddress

Use this command to set the PWA IP address. This is the IP address of the end station from which PWA will prevent network access until the user is authenticated.

Syntax

set pwa ipaddress *ip-address*

Parameters

ip-address	Specifies a globally unique IP address. This same value must be configured into every authenticating switch in the domain.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set a PWA IP address of 1.2.3.4:

```
B2(su)->set pwa ipaddress 1.2.3.4
```

set pwa protocol

Use this command to set the port web authentication protocol.

Syntax

set pwa protocol {**chap** | **pap**}

Parameters

chap | **pap**	Sets the PWA protocol to: • CHAP (PPP Challenge Handshake Protocol) - encrypts the username and password between the end-station and the switch port. • PAP (Password Authentication Protocol- does not provide any encryption between the end-station the switch port.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set a the PWA protocol to CHAP:

```
B2(su)->set pwa protocol chap
```

set pwa guestname

Use this command to set a guest user name for PWA networking. PWA will use this name to grant network access to guests without established login names and passwords.

Syntax

set pwa guestname *name*

Parameters

name	Specifies a guest user name.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to set the PWA guest user name to “guestuser”:

```
B2(su)->set pwa guestname guestuser
```

clear pwa guestname

Use this command to clear the PWA guest user name.

Syntax

clear pwa guestname

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to clear the PWA guest user name

```
B2(su)->clear pwa guestname
```

set pwa guestpassword

Use this command to set the guest user password for PWA networking.

Syntax

```
set pwa guestpassword
```

Parameters

None.

Defaults

None.

Mode

Switch command, read-write.

Usage

PWA will use this password and the guest user name to grant network access to guests without established login names and passwords.

Example

This example shows how to set the PWA guest user password name:

```
B2(su)->set pwa guestpassword
Guest Password: *********
Retype Guest Password: *********
```

set pwa gueststatus

Use this command to enable or disable guest networking for port web authentication.

Syntax

```
set pwa gueststatus {authnone | authradius | disable}
```

Parameters

authnone	Enables guest networking with no authentication method.
authradius	Enables guest networking with RADIUS authentication. Upon successful authentication from RADIUS, PWA will apply the policy returned from RADIUS to the PWA port.
disable	Disables guest networking.

Defaults

None.

Mode

Switch command, read-write.

Usage

PWA will use a guest password and guest user name to grant network access with default policy privileges to users without established login names and passwords.

Example

This example shows how to enable PWA guest networking with RADIUS authentication:

```
B2(su)->set pwa guestnetworking authradius
```

set pwa initialize

Use this command to initialize a PWA port to its default unauthenticated state.

Syntax

set pwa initialize [*port-string*]

Parameters

port-string	(Optional) Initializes specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, all ports will be initialized.

Mode

Switch command, read-write.

Example

This example shows how to initialize ports ge.1.5-7:

```
B2(su)->set pwa initialize ge.1.5-7
```

set pwa quietperiod

Use this command to set the amount of time a port will remain in the held state after a user unsuccessfully attempts to log on to the network.

Syntax

set pwa quietperiod *time* [*port-string*]

Parameters

time	Specifies quiet time in seconds.
port-string	(Optional) Sets the quiet period for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, quiet period will be set for all ports.

Mode

Switch command, read-write.

Example

This example shows how to set the PWA quiet period to 30 seconds for ports ge.1.5-7:

```
B2(su)->set pwa quietperiod 30 ge.1.5-7
```

set pwa maxrequest

Use this command to set the maximum number of log on attempts allowed before transitioning the PWA port to a held state.

Syntax

set pwa maxrequests *requests* [*port-string*]

Parameters

maxrequests	Specifies the maximum number of log on attempts.
port-string	(Optional) Sets the maximum requests for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, maximum requests will be set for all ports.

Mode

Switch command, read-write.

Example

This example shows how to set the PWA maximum requests to 3 for all ports:

```
B2(su)->set pwa maxrequests 3
```

set pwa portcontrol

This command enables or disables PWA authentication on select ports.

Syntax

set pwa portcontrol {**enable** | **disable**} [*port-string*]

Parameters

enable | **disable**	Enables or disables PWA on specified ports.
port-string	(Optional) Sets the control mode on specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, PWA will enabled on all ports.

Mode

Switch command, read-write.

Example

This example shows how to enable PWA on ports 1-22:

```
B2(su)->set pwa portcontrol enable ge.1.1-22
```

show pwa session

Use this command to display information about current PWA sessions.

Syntax

show pwa session [*port-string*]

Parameters

port-string	(Optional) Displays PWA session information for specific port(s). For a detailed description of possible *port-string* values, refer to "Port String Syntax Used in the CLI" on page 7-2.

Defaults

If *port-string* is not specified, session information for all ports will be displayed.

Mode

Switch command, read-only.

Example

This example shows how to display PWA session information:

```
B2(su)->show pwa session
Port     MAC               IP              User          Duration     Status
-------- ----------------- --------------- ------------- ------------ ---------
ge.2.19  00-c0-4f-20-05-4b 172.50.15.121   pwachap10     0,14:46:55   active
ge.2.19  00-c0-4f-24-51-70 172.50.15.120   pwachap1      0,15:43:30   active
ge.2.19  00-00-f8-78-9c-a7 172.50.15.61    pwachap11     0,14:47:58   active
```

set pwa enhancedmode

This command enables PWA URL redirection. The switch intercepts all HTTP packets on port 80 from the end user, and sends the end user a refresh page destined for the PWA IP Address configured.

Syntax

set pwa enhancedmode {**enable** | **disable**}

Parameters

enable | **disable**	Enables or disables PWA **enhancedmode**.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to enable PWA **enhancedmode**:

```
B2(su)->set pwa enhancedmode enable
```

Configuring Secure Shell (SSH)

Purpose

To review, enable, disable, and configure the Secure Shell (SSH) protocol, which provides secure Telnet.

Commands

For information about...	Refer to page...
show ssh status	19-73
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show ssh status

Use this command to display the current status of SSH on the switch.

Syntax

show ssh status

Parameters

None.

Defaults

None.

Mode

Switch command, read-only.

Example

This example shows how to display SSH status on the switch:

```
B2(su)->show ssh status
 SSH Server status: Disabled
```

set ssh

Use this command to enable, disable or reinitialize SSH server on the switch. By default, the SSH server is disabled.

Syntax

set ssh {**enable** | **disable** | **reinitialize**}

Parameters

enable | disable	Enables or disables SSH, or reinitializes the SSH server.
reinitialize	Reinitializes the SSH server.

Defaults

None.

Mode

Switch command, read-write.

Example

This example shows how to disable SSH:

```
B2(su)->set ssh disable
```

set ssh hostkey

Use this command to set or reinitialize new SSH authentication keys.

Syntax

```
set ssh hostkey [reinitialize]
```

Parameters

reinitialize	(Optional) Reinitializes the server host authentication keys.

Defaults

If **reinitialize** is not specified, the user must supply SSH authentication key values.

Mode

Switch command, read-write.

Example

This example shows how to regenerate SSH keys:

```
B2(su)->set ssh hostkey reinitialize
```

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